Herbs and Spices
Culinary Herbs and Spices

- Herbs and spices associated with cooking
- “Herbs” are generally aromatic leaves used to spice food (many Mediterranean).
- “Spices” are generally fruits, flowers, seeds of tropical origin used in cooking (many Asian).
- We consider them together
- More than $2 billion per year business in the U.S.
- U.S. imports more than $80,000,000 per year.
- Fascinating history, tied to exotic places and world history
Mostly aromatic leaves, from Mediterranean region
“Spices”

Mostly tropical aromatic fruits, seeds, roots, and bark
Certain Herbs Are Associated To A Particular Culinary Style

<table>
<thead>
<tr>
<th>Culinary style</th>
<th>Herbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexican</td>
<td>cilantro, garlic, cumin, coriander, Mexican oregano, epazote, chilies</td>
</tr>
<tr>
<td>Italian</td>
<td>rosemary, thyme, basil, oregano</td>
</tr>
<tr>
<td>French</td>
<td>rosemary, thyme, tarragon, oregano, Herbes de Provence blend</td>
</tr>
<tr>
<td>Indian</td>
<td>curry powder, cinnamon, ginger, coriander, turmeric</td>
</tr>
<tr>
<td>Asian</td>
<td>ginger, garlic, lemongrass</td>
</tr>
</tbody>
</table>
Where do they come from?

• Several came from the Americas (allspice, *Capsicum* peppers, and vanilla).

• Many “herbs” come from the Mediterranean: the common herbs we use (mint, basil, thyme).

• Some from colder areas of Eurasia: Caraway, horseradish.

• Most “spices” from S.E. Asia (pepper, ginger).

• Native indigenous cultures use many other plants (studied by ethnobotanists).

• Major spices tend to be used all over the world today. You can grow many herbs yourself.
Essential Oils

• Most spices and herbs owe their properties to the presence of volatile compounds known collectively as "essential oils". These compounds make up the aroma or “essence” of the plant.

• Volatile oils often found in special plant cells and glands. Found in all parts of plants and the contents of the different parts often differ.

• Some spices are used as extracts and others are used as whole plant material.
Essential Oil Chemistry

Isoprene

Terpenes
- Monoterpenes
  - α-Pinene
  - Limonene
  - Sabinene
  - P-cymene
  - γ-Terpinene

- Sesquiterpenes
  - β-Caryophyllene

Terpenoids
- Monoterpenoids
  - Linalool
  - Citronellal
  - Thymol
  - Carvacrol
  - Carvone
  - Borneol

Phenylpropanoids
- Cinnamaldehyde
- Eugenol
- Vanillin
- Safrole

Others
- Allyl-isothiocyanate
- Allicin
External secretory structures
Typically occur in specialized cells, glands or vessels

Lavender (*Lavendula*)

Tomato leaf – glands and hairs

Peppermint (*Mentha*)

Common essential oils that have glandular trichomes: Basil, Lavender, Marjoram, Melissa, Oregano, Peppermint, Rosemary, and Spearmint
Internal Glands and Secretory Cavities

- **Common essential oils with secretory cavities:** Citrus oils: Bergamot, Grapefruit, Lemon, Lime, Orange, and Tangerine; Eucalyptus species; Clove bud; and Resin trees: Benzoin, Frankincense, and Myrrh
- **Common essential oils with secretory ducts:** Angelica, Caraway, Carrot seed, Dill, Fennel, Fir, Cedar, Pine, Spruce, Juniper, and Cypress
Functions of Essential Oils

- Defense – against herbivores, insects, grazers
- Repel – invaders, fungi, bacteria
- Attraction – aromas for pollinating insects

The orchid and the orchid bee. Photo by H. Nijssen
Flower Scents Attract Pollinators
Essential Oils Extracted for Perfume Industry

Box Figure 5.3  Rose petals undergo distillation to extract rose oil, one of the perfume industry’s most valued scents.
Distillation of Essential Oils

THE DISTILLATION PROCESS

This representation of a traditional still shows steam passing through plant material, carrying its volatile components out through the top of the chamber. The steam and vaporized essence then condense to form fragrant water (hydrolat) and essential oil. Because the oil collects on the water’s surface, it is easily drained off and collected in a hand-held flask.
Aromatherapy

• The art and science of utilizing aromatic essences from plants to balance, harmonize and promote the health of body, mind and spirit.
• Seeks to unify physiological, psychological and spiritual processes to enhance an individual’s innate healing process.
• Term coined by French perfumer and chemist, Rene- Maurice Gattefosse in 1937. Meant to distinguish the medicinal application of essential oils from their perfumery applications
Limbic system (old mammalian brain) governs emotions and behavior, involved in the formation of long-term memory, and closely associated with the olfactory structures.
# Table 17.A Commonly Used Essential Oils for Aromatherapy

<table>
<thead>
<tr>
<th>Essential Oil</th>
<th>Common Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgarian rose</td>
<td>Antiseptic, insomnia, relaxation</td>
</tr>
<tr>
<td>Cypress</td>
<td>Antiseptic, asthma, coughing, relaxation</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>Anti-inflammatory, arthritis, relaxation</td>
</tr>
<tr>
<td>Frankincense</td>
<td>Coughing, bronchitis</td>
</tr>
<tr>
<td>Geranium</td>
<td>Dermatitis, relaxation, depression</td>
</tr>
<tr>
<td>Ginger</td>
<td>Bronchitis, arthritis, stimulant</td>
</tr>
<tr>
<td>Juniper</td>
<td>Antiseptic, aches, pains, relaxation</td>
</tr>
<tr>
<td>Lavender</td>
<td>Antiseptic, respiratory infections, relaxation</td>
</tr>
<tr>
<td>Marjoram</td>
<td>Respiratory infections, relaxation</td>
</tr>
<tr>
<td>Pine</td>
<td>Asthma, arthritis, depression</td>
</tr>
<tr>
<td>Roman chamomile</td>
<td>Toothaches, arthritis, tension</td>
</tr>
<tr>
<td>Rosemary</td>
<td>Bronchitis, depression, mental alertness</td>
</tr>
<tr>
<td>Sandalwood</td>
<td>Acne, bronchitis, depression</td>
</tr>
<tr>
<td>Tea tree</td>
<td>Respiratory infections, acne, depression</td>
</tr>
<tr>
<td>Herb</td>
<td>Uses</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sage</td>
<td>Fights Infections, Heals Wounds, Calms Upset Stomach</td>
</tr>
<tr>
<td>Rosemary</td>
<td>Boosts Mental Activity, Calming/Stress Relief, Natural Antiseptic</td>
</tr>
<tr>
<td>Lavender</td>
<td>Calming/Stress Relief, Relieves Insomnia, Decreases PMS Symptoms</td>
</tr>
<tr>
<td>Rose</td>
<td>Natural Astringent/Clears Skin, Reduces Scars/Wrinkles, Decreases Muscle Tightness, Eases Headache Pain</td>
</tr>
<tr>
<td>Peppermint</td>
<td>Clears Respiratory Passages, Decreases Indigestion &amp; Nausea, Eases Headache Pain</td>
</tr>
<tr>
<td>Lemon</td>
<td>Fights Fevers, Boosts Immune System, Clears Respiratory Passages</td>
</tr>
<tr>
<td>Orange</td>
<td>Aphrodisiac, Antidepressant, Decreases Inflammation/Pain</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Detoxifies &amp; Moisturizes Skin, Decreases Eye Puffiness, Calming/Stress Relief</td>
</tr>
<tr>
<td>Cinnamon</td>
<td>Reduces Nervousness, Improves Circulation, Relieves Joint Pain</td>
</tr>
<tr>
<td>Star Anise</td>
<td>Calming/Stress Relief, Relieves Arthritic Pain, Decreases Flatulence</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>Clears Respiratory Passages, Eases Muscle &amp; Joint Pain, Kills Lice</td>
</tr>
<tr>
<td>Chamomile</td>
<td>Antidepressant, Reduces Nervousness, Tones Skin</td>
</tr>
<tr>
<td>Vanilla</td>
<td>Aphrodisiac, Antidepressant, Calming/Stress Relief</td>
</tr>
<tr>
<td>Jasmine</td>
<td>Relieves Muscle Spasms, Reduces Scars, Decreases PMS Symptoms</td>
</tr>
<tr>
<td>Tea Tree</td>
<td>Antifungal, Antiseptic, Heals Wounds</td>
</tr>
</tbody>
</table>
Essential Oils
Using Essential Oils for Aromatherapy

- **Diffusion**
- **Massage**
- **Inhalation**
- **Candles**
- **Soap**
- **Bath**
Essential Oils YouTube Videos

Aromatic Oil Distillation plant by Best Engineering Technologies
https://www.youtube.com/watch?v=TRhhS4OrJr8&t=75

Distilling Essential oil
https://www.youtube.com/watch?v=RR9vKd_Auz4

Essential Oil Extraction: Spearmint Oil via Direct Steam
https://www.youtube.com/watch?v=zQ7V8ObABA4

How It's Made - Lavender Essential Oil
https://www.youtube.com/watch?v=Cz_jYx4dF0U

Science of Essential Oils
https://www.youtube.com/watch?v=vryNtoYGUzY
Spices
Spices

- We take spices for granted.
- Today they are inexpensive compared to the past.
### Some Common Spices

**Table 17.1**

<table>
<thead>
<tr>
<th>Spices</th>
<th>Scientific Name</th>
<th>Family</th>
<th>Part Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allspice</td>
<td>Pimenta dioica</td>
<td>Myrtle</td>
<td>Fruit</td>
</tr>
<tr>
<td>Black pepper</td>
<td>Piper nigrum</td>
<td>Pepper</td>
<td>Fruit</td>
</tr>
<tr>
<td>Capsicum peppers</td>
<td>Capsicum annuum, Capsicum baccatum, Capsicum chinense, Capsicum frutescens, Capsicum pubescens</td>
<td>Tomato</td>
<td>Fruit</td>
</tr>
<tr>
<td>Cassia</td>
<td>Cinnamomum cassia</td>
<td>Laurel</td>
<td>Bark</td>
</tr>
<tr>
<td>Cinnamon</td>
<td>Cinnamomum zeylanicum</td>
<td>Laurel</td>
<td>Inner bark</td>
</tr>
<tr>
<td>Cloves</td>
<td>Eugenia caryophyllata</td>
<td>Myrtle</td>
<td>Flower</td>
</tr>
<tr>
<td>Ginger</td>
<td>Zingiber officinale</td>
<td>Ginger</td>
<td>Rhizome</td>
</tr>
<tr>
<td>Mace</td>
<td>Myristica fragrans</td>
<td>Nutmeg</td>
<td>Aril</td>
</tr>
<tr>
<td>Nutmeg</td>
<td>Myristica fragrans</td>
<td>Nutmeg</td>
<td>Seed</td>
</tr>
<tr>
<td>Saffron</td>
<td>Crocus sativus</td>
<td>Iris</td>
<td>Stigma</td>
</tr>
<tr>
<td>Turmeric</td>
<td>Curcuma longa</td>
<td>Ginger</td>
<td>Rhizome</td>
</tr>
<tr>
<td>Vanilla</td>
<td>Vanilla planifolia</td>
<td>Orchid</td>
<td>Fruit</td>
</tr>
</tbody>
</table>
Spices in Ancient Times

- Spices used in Egypt 2500 B.C.
- Embalming mummies
- Food preservation, flavor.
- Perfumery, religion.
- Cardamon, pepper, myrrh, cassia, cinnamon, cumin, anise and marjoram commonly used
- Many plants used in Egypt were not native, imported from India even at that time.

The Mummification Process
https://www.youtube.com/watch?v=-MQ5dL9cQX0
Timeline of Spice Trade (approximate)

- 2500 BP - Egyptians, using spices for embalming, perfume, cooking, medicine
- 2000 BP – Greeks and Romans used lots of spices
- 1500 BP - Trade routes established across Asia
- 1000 BP - Arabs dominate spice trade. Crusaders learn about spices
- 500 BP – Age of Discovery; Europeans find new routes to spice trade, dominated by Portuguese, Dutch, and British; Spain “discovers” New World spices
Later blocked by the Ottoman Empire in 1453, spurring exploration to find alternative sea routes.
Map showing the ancient spice route from China to the spice islands of Indonesia and from Arabia to India and then to the Spice Islands. As well as the Mediterranean routes to Europe the old route across North Africa is shown. Also included on the map (blue lines) is the silk road extending from the Middle East to China.
• 600-1100 AD – Dark Ages, European use of spices reduced
• 1096 – Crusades, spices rediscovered by Europeans, developed taste for them
• 1271 - Marco Polo visits China, clarifies origins of many spices in Asia
• 1200s - Genoa and Venice get rich on spice trade
• 1453 – spice trade blocked by the Ottoman Empire, spurring exploration to find alternative sea routes
The fall of Constantinople in 1453 (modern day Istanbul, Turkey) to the Ottomans ended the 1,500 year Roman empire which cut off the land connection between Europe and Asia.
In 1497, Vasco da Gama led four ships around the Cape of Good Hope. After a 10-month voyage, da Gama finally reached the great spice port of Calicut on the west coast of India. The long voyage home took a heavy toll.
News of Portugal’s successes spurred other nations to look for a sea route to Asia. An Italian navigator from the port of Genoa, Christopher Columbus, sought Portuguese backing for his own plan. He wanted to reach the Indies’ by sailing west across the Atlantic. Like most educated Europeans, Columbus knew that the Earth was a sphere.
Age of Discovery
Between 1602 and 1680 European traders brutally fought for control, sometimes torturing and executing those they fought against. By the mid 1600s the Dutch East India Company of Holland had established themselves as the strongest force in the islands.
Spice Wars

- **1400s** – Europeans search for new trade routes and sources for spices.
- **1500s** – Portuguese circumnavigate world, find Spice Islands, monopolize spice trade
- **1600s** – Dutch dominate Asian spice trade
- **1800s** – British control Asian spice trade
- **1900s** – European colonies achieve independence, legacy of colonialism still felt
Major Spices
Cinnamon - *Cinnamomum*

- Two main species:
  - *C. verum* – true Cinnamon
  - *C. aromaticum* – Cassia, but also called cinnamon

Lauraceae, Laurel Family
Cinnamon - *Cinnamomum*

- One of the oldest and most important spices.
- Used in ancient times by Egyptians, Phoenicians.
- Well known to the Greeks, had lots of strange tales about where it came from.
- One of the most sought out spices in early explorations.
- Native to Bangladesh, Sri Lanka, the Malabar Coast of India, and Burma.
Cinnamomum verum, Lauraceae
a.k.a. Ceylon Cinnamon
Essential Oil Industry in Sri Lanka: Part I (Cinnamon, Citronella)
https://www.youtube.com/watch?v=wCJ7K-oFdPk
Essential Oil Industry in Sri Lanka: Part II
https://www.youtube.com/watch?v=XdQveoRAs1o
The Spice Of Life - Cinnamon: The Elegant Addition- 1983 BBC production
https://www.youtube.com/watch?v=ZsfchIo_SWw

THE CINNAMON STORY
https://www.youtube.com/watch?v=4GO-rxNI6M0
Introduction to cinnamon industry in Sri Lanka
https://www.youtube.com/watch?v=jEJ1dYPgl64
Black and White Pepper

*Piper nigrum* – *Piperaceae*

- Pepper – drupe, dried and processed
- Black pepper – fermented, dried ("peppercorn")
- White pepper – mesocarp allowed to rot
- Green pepper – pickled in brine or vinegar
Piper nigrum
Black pepper, *Piper nigrum* (Piperaceae)

• In terms of quantities traded, black pepper is still the most important spice. It was also an early important spice and probably the most important in leading to the discovery of the New World.

• Black pepper is made by picking the green fruits of *Piper nigrum* (Piperaceae) and processing them. This process involves fermentation.

• White pepper is made from ripe fruits that are soaked and lightly crushed to remove the fleshy part.
Black and white peppercorns

**Piperine** - Found in Pepper (mild)

The Chemistry of Pepper: The Spice that Changed the World - Reactions

[https://www.youtube.com/watch?v=O0KJunDHk8Y](https://www.youtube.com/watch?v=O0KJunDHk8Y)
Pepper begins to lose flavor shortly after grinding, reason for freshly ground pepper.
• The U.S. is the world's leading user of black pepper.
• Produced in Indonesia, India, Brazil and Madagascar.

Spice Trip Cambodia - Black Pepper
https://www.youtube.com/watch?v=CTLmBGUtEO4
How to Grow Black Pepper (Piper nigrum)
https://www.youtube.com/watch?v=XOoBqQmz8jc
The Spice of Life - Pepper: The Master Spice - BBC
https://www.youtube.com/watch?v=NuZujx-LMfg
Cloves - *Syzygium aromaticum*

Unopened flower buds

**Eugenol** - Oil found in cloves, responsible for the aroma and flavor
Cloves, *Syzygium aromaticum*, Myrtaceae

- Cloves, the flower buds of a tree
- Native to the Spice Islands
- Cloves were specifically prized by Europeans for medicinal purposes
- Used in dentistry to deaden toothaches
- Imported by the Greeks through Alexandria before the Roman Empire.
- One of the spices on which the Dutch had a monopoly.
Nutmeg and cloves grew only in one place on earth: on a few small islands called the Moluccas (in present-day Indonesia), north-west of present-day New Guinea. These islands became known as the Spice Islands.
Clove King of spice
https://www.youtube.com/watch?v=rGCMuJITZAk
The Spice of Life - Cloves: Nature's Little Nails - BBC Production 1983
https://www.youtube.com/watch?v=XISqsDKWPl0
clove harvest in aceh sumatra
https://www.youtube.com/watch?v=GdoVlNecIhl
Usually cloves grow their best, when they are cultivated near the coastal area. According to the old saying “cloves must see the sea to prosper”. The rich smell of cloves can be smelt from far and perhaps that was how the ancient explorers could discover the spice land.

Harvested clove buds being segregated from the stalks at Ambanad in Kollam
Clove Cigarettes

- About one half of the world's supply of cloves is used each year for making cigarettes in Indonesia.
- Contain 60% to 70% tobacco, 30% to 40% ground cloves (aromatic dried flower buds), clove oil, and other additives.
- They are primarily produced in Indonesia, where they are the preferred (smoked by 90% of smokers) smoking product.
Nutmeg and Mace (Myristica *fragrans*, Myristicaceae)
Nutmeg and Mace

• Both nutmeg and mace come from the same tree (*Myristica fragrans*, Myristicaceae).
• The fruit is a drupe that splits open at maturity and exposes the red aril. When dried, the aril is called mace.
• The inner part of the seed is called nutmeg. Nutmeg is both toxic and hallucinogenic.
• Today widely grown in the West Indies, Sri Lanka, and the Moluccas.
• Dioecious, and most male trees removed as soon as possible.
Nutmeg and Mace
NUTMUG anatomy

fruit

mace

ground seed
Nutmeg and Mace - Peeling
Nutmeg and Mace - Drying
Ginger - Zingiber
Ginger – *Zingiber officinale*, Zingiberaceae
Zingiberaceae – Ginger Family

- Turmeric – rhizome of *Curcuma domestica*, used for flavoring and color.
- Cardamon - rround seed of *Elettaria cardamomum*
- Both cardamom (*Elettaria cardamomum*) and ginger (*Zingiber officinale*) come from southeast Asia.
- Ginger comes from the rhizome, and cardamom from the seeds.
- All were introduced into Europe by several hundred years B.C.
Ginger – *Zingiber officinale*, Zingiberaceae

Originally from SE Asia, Ginger now comes from West Africa, India, and especially Jamaica (considered the finest).

**Zingerone** - Found in ginger

![Zingerone molecule](image)
Cardamom - *Elettaria cardamomum*
Cardamom - *Elettaria cardamomum*

- Zingiberaceae
- Ground seed of *Elettaria cardamomum*
- Comes from India and Guatemala
- India - used in curry blends
- Scandinavian countries added to breads
- Most is used in Arabic countries as a flavoring for coffee.
Turmeric, *Cucurma longa*, Zingiberaceae

- Used as brilliant yellow dye to color both food and fabric
- Common ingredient in yellow mustard, curry powder
- Middle Eastern and East Indian cooking
Saffron, *Crocus sativus*, Iridaceae
Kashmiri farmers pluck threads, or crocus, from saffron flowers
Saffron - *Crocus sativus*

- World’s most expensive spice
- Mediterranean countries and Asia Minor
- Stigmas picked by hand
- Pungent flavor, widely used in cooking
- Important as yellow dye
Saffron - *Crocus sativus*
New World Spices - *Capsicum*

*Capsicum* – Solanaceae

*C. annuum* – Sweet, bell peppers

*C. frutescens* – hot peppers

*C. chinense* – hot peppers
Capsicum peppers

- Capsicum peppers are now widely cultivated in many parts of the world.
- About 4-5 species are cultivated.
- They have become an integral part of cooking in many parts of the world.
Capsicum annuum, Solanaceae

Sweet green and red peppers

Cultivated as ornamental

The Spice of Life - Chilies: A Dash Of Daring - 1983 BBC Production
https://www.youtube.com/watch?v=-P0Fkf1N97Q
Chile Farming - America's Heartland
https://www.youtube.com/watch?v=uRClfIn35Uc
Scoville Heat Scale

How hot is hot?
Group of tasters
Ranked successive dilutions until no more heat detected

- Bell pepper – 0 (no heat at all)
- Banana pepper – 100 -500
- Jalapeno pepper – 2,500-8,000

**Capsaicin**
Found in chilies (hot)
<table>
<thead>
<tr>
<th>Peppers</th>
<th>Scoville Heat Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aji</td>
<td>30,000–50,000</td>
</tr>
<tr>
<td>Banana (sweet)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Bell</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Capsaicin</td>
<td>16,000,000</td>
</tr>
<tr>
<td>Cayenne</td>
<td>30,000–50,000</td>
</tr>
<tr>
<td>Cherry</td>
<td>100–500</td>
</tr>
<tr>
<td>Chiltepin</td>
<td>50,000–100,000</td>
</tr>
<tr>
<td>Habanero</td>
<td>100,000–300,000</td>
</tr>
<tr>
<td>Jalapeño</td>
<td>2,500–5,000</td>
</tr>
<tr>
<td>Jamaican hot</td>
<td>100,000–200,000</td>
</tr>
<tr>
<td>Pimento</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Scotch bonnet</td>
<td>100,000–250,000</td>
</tr>
<tr>
<td>Tabasco</td>
<td>30,000–50,000</td>
</tr>
<tr>
<td>Thai</td>
<td>70,000–80,000</td>
</tr>
</tbody>
</table>
Allspice – *Pimenta dioica*, Myrtaceae

- Aromatic dried berries
- Long used by Mayans
- Western hemisphere, mostly Jamaica
- Multi-faceted flavour, cinnamon, nutmeg, and cloves
- Baked goods, jerked meat, BBQ, sausages
Vanilla, Vanilla planifolia, Orchidaceae

Figure 17.10  (a) Fruits of the vanilla vine, the source of vanilla flavoring. (b) Cured vanilla beans.
Vanilla, *Vanilla planifolia* (Orchidaceae)

• Vanilla is the fermented fruit of an orchid. This is almost the only plant in the family that is important as a food plant.

• Orchid vine

• The plant is native to Mexico and other parts of Latin America. The Aztecs used it to flavor chocolate (along with chile peppers).

• The plants are usually hand pollinated. Good quality vanilla is expensive. Madagascar, Reunion, and Seychelles are major growers.
Vanilla flowers and hand pollinating vanilla flowers

The delicate work has to be done within eight hours of the flower opening,
Longitudinal section of a vanilla flower

- Upper sepal
- Rostellum (membrane)
- Anther (with pollen)
- Modified lower petal (or labellum)
- Right lower sepal
- Left lower sepal
- Stigma
- Column (or gynandrium)
- Ovary (to be the bean)
- Ovules (to be the seeds)

Width of sepals and lateral petals has been reduced to make the picture clearer.
Vanilla Processing – Killing, Sweating
Vanilla Processing - Drying

Madagascar
Vanilla Extracts
Vanilla YouTube Videos

Hand pollinating a vanilla orchid (Fair Trade)
https://www.youtube.com/watch?v=i_Pguwl9c1Q

Madagascar: Vanilla farmers
https://www.youtube.com/watch?v=0PoIgYMXnCQ

How to pollinate Vanilla planifolia - detailed explanation!
https://www.youtube.com/watch?v=1RdoTcDD2EU&list=PLxQXLuCX7-OE3wn2ZMnZ-WGYJldw7Y-b1

How to plant and grow vanilla
https://www.youtube.com/watch?v=Nhju7wj-Lnl
Herbs

Mint
Use to garnish sweets or stir into lemonade.

Rosemary
Use to flavor sprigs to season a marinade for beef.

Basil
Add to a simmering pasta sauce just before serving.

Purple Basil
Substitute for green basil in a pesto sauce.

Bay Leaves
Flavor soups and stew with whole leaves; remove before serving.

Oregano
Sprinkle into tomato sauce destined for a pizza.

Dill
Add a bunch to homemade chicken soup.

Cilantro
Kech up fresh or bottled salsa.

Thyme
Combine thyme, salt and pepper with flour for dredging poultry.

Tarragon
Stir into mayonnaise with a bit of lemon zest for a tangy spread.

Chives
Mash into batter and melt over roasted potatoes.

Chervil
Pairs well with scrambled or baked egg dishes.

Italian Parsley
Mix into bread crumbles as a coating for chicken or fish.

Sage
The strong flavor stands up well in mise en place dishes.

Marjoram
The fresh, citrusy flavor is great on chicken or beef.
Herbs and Spices of the Mediterranean Area

The mint family (Lamiaceae or Labiatae) especially common the Mediterranean area and also as a source of herbs from there.

Among the mints are

• rosemary (*Rosmarinus officinalis*),
• thyme (*Thymus vulgaris* and other species),
• oregano (*Origanum vulgare*),
• basil (*Ocimum basilicum*), and
• marjoram (*O. majorana*).
Patterns of the Mint Family

- Opposite leaves
- 4 stamens (2 long, 2 short)
- 5 united petals (2 lobes up, 3 down)
- 5 united sepals
- Flower matures into a seed capsule containing four nutlets

Horehound: square stalk

Self Heal
Mints

Spearmint
*Mentha spicata*

Peppermint
*Mentha piperita*
Mints

• "Mint", usually refers to spearmint (Mentha spicata) or peppermint (M. piperita).

• The essential oils from these plants are extremely important for flavoring hundreds of products, e.g., toothpaste, mouthwash and chewing gum.

• Much in U.S. is grown in Indiana, Michigan and Oregon.

• How many times do you encounter mint each day?
Idaho is one of the top three producers of mint in the United States, with about 13,000 acres of mint still grown by 100 farmers across the state.
• 90 percent of the mint oil produced is used by toothpaste, mouthwash, and gum manufacturers, with the last 10% used to flavor candy, ice cream, cookies, and pharmaceuticals.

• One drum of oil, which weighs about 400 pounds, will flavor approximately 400,000 tubes of toothpaste, or 5,000,000 sticks of gum, or 20,000,000 candies!

• Pure mint oil is so strong that one drop alone will flavor 2.5 tubes of toothpaste, 31.25 sticks of gum, or 125 mint candies.
Oregano and Marjoram - *Origanum*

**Oregano**
- *Origanum vulgare*
- Biting flavor
- Loved by Greeks and Romans
- Used in many Italian dishes, pizza, spaghetti

**Marjoram**
- *Origanum majorana*
- Mild flavor
Basil – *Ocimum basilicum*

- “King of Herbs”
- One of oldest herbs
- Native to India, sacred to Hindus
- Sweet aromatic flavor
- Goes with tomato dishes (Italian)

The popularity of Italian food (which in the US mostly goes back to World War II) is responsible for the widespread use of basil and oregano in the U.S.
Sage, *Salvia officinalis*, Lamiaceae

- Grown for centuries in the Old World for its food and healing properties
- Savory, slightly peppery flavor
- One of the essential herbs, along with “parsley, sage, rosemary and thyme”
- Used since ancient times for warding off evil, snakebites, increasing women's fertility, and more
Lavender - *Lavendula*

- Lavere = “to wash” in Latin
- Used by Romans to scent their baths
- Nice smell, used in perfume, potpourri, sachets
Thyme (*Thymus vulgaris*) Lamiaceae

- Ancient herb plant native to Mediterranean area
- Small grayish-green leaves
- Used to treat melancholy, reproductive system ailments, and to improve digestion
- Spicy with a minty edge, agreeable aromatic smell and a warm pungent taste.
Parsley Family - Apiaceae

Schizocarps

compound umbels

Fennel fruit
Fennel fruit x-section

Mericarp
Cumin

Schizocarp

Mericarp
Parsley Family - Apiaceae

Major family of Mediterranean herbs. In this group:

- Parsley (*Petroselinum crispum*)
- Dill (*Anethum graveolens*)
- Coriander or cilantro (*Coriandrum sativum*), used as a fruit and as the leaf.
- Chervil (*Anthriscus cerefolium*)
- Caraway (*Carum carvi*)
- Anise (*Pimpinella anisum*)
- Cumin (*Cuminum cyminum*)
- Celery (*Apium graveolens*)
Parsley – *Petroselinum crispum*

- Well-known Apiaceae
- Mediterranean
- Garnish and flavor
- Freshens breath
Dill – *Anethum graveolens*

- Both leaves and fruit are used
- Common in Russia, Ukraine, Poland
- Toppings for soup, borscht, buttered potatoes
- Used to flavor pickles
Caraway Seeds – *Carum carvi*

One of oldest herbs known. Used in cheese, sausages, and bread.
Cumin - *Cuminum cyminum*

- Mediterranean to India
- Used over 2,000 years
- Seeds used whole or ground
- Many cuisines, Indian, Mexican, sometimes kept on table
- Add earthy warming feeling to food
Mustard Family - Brassicaceae

Patterns of the Mustard Family

Mustard seed pods come in many shapes and sizes, but always occur on the plant in the same radial pattern around the stalk, a "raceme".

Wall Flower

The seed pods split open from both sides to expose a clear membrane in the middle.
Mustard, *Brassica nigra*, Brassicaceae

- The Brassicaceae or Cruciferae are also very important as herbs.
- The seeds of *Brassica nigra* (strong) and *B. alba* (mild) have long been used for mustard sauces.
- Mustard oils give them unique smell and taste.
Yellow Mustard

4 teaspoons dry ground mustard
1/4 cup water
3 tablespoons white vinegar
1/2 teaspoon Flour
1/8 teaspoon salt
1/8 teaspoon turmeric
1 pinch garlic powder
1 pinch paprika

Mustard Through The Ages
https://www.youtube.com/watch?v=lkxJualuFbI
Production of Mustard
https://www.youtube.com/watch?v=Uqc2dDnjXFU
The Spice of Life - Mustard: The Spice Of Nations - 1983 BBC production
https://www.youtube.com/watch?v=Q7tnsWRrvpg
Horseradish, *Armoracia rustica*, Brassicaceae

Collinsville, Illinois
Horseradish Capitol of the world

This plant is native to Northern Europe.
Horseradish – *Armoracia rusticana*

**Figure 17.12** The large taproots of horseradish are grated to make horseradish sauce.

International Horseradish Festival  
[https://www.youtube.com/watch?v=PF2w5b2uqUA](https://www.youtube.com/watch?v=PF2w5b2uqUA)

Illinois Horseradish Festival, Pt.1 - America's Heartland  
[https://www.youtube.com/watch?v=lzR48-XOkLA](https://www.youtube.com/watch?v=lzR48-XOkLA)

Illinois Horseradish Festival, Pt.2 - America's Heartland  
[https://www.youtube.com/watch?v=Tzx-xGZ4z3Q](https://www.youtube.com/watch?v=Tzx-xGZ4z3Q)
Wasabi – *Eutrema japonica*

- Japanese, grows on stream banks
- *Brassicaceae*
- Grown in water
- Rhizome, used fresh or dried into powder
- Extremely strong pungency, affects nasal passages
Pungent Alliums
Food, herb, or spice?

- Onion (*A. cepa*)
- Garlic (*A. sativum*)
- Leeks (*A. porrum*)
- Shallots (*A. ascolonicum*)
- Chives (*A. schoenoprasum*)

Ancient cultivated plants
Sulfur-containing compounds, allicin, released when tissues cut, cause tears, anti-microbial
End