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Introduction to Vegetable Classification by Family Groups and Growth Habits

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Thanksgiving Point Office
Classification By Botanical Family

- Common system for vegetable classification
- **Kings Play Cards On Fat Green Stools**

**Phylum(Division)** – Spermatophyta (plants bear seeds)
- **Class** – Angiospermae (seeds enclosed)
  - **Subclass** – Dicotyledoneae (2 cotyledons/seed leaves)
    - **Family** – Solanaceae (nightshade family)
    - **Genus** – *Solanum*
      - **Species** – *lycopersicum*
      - **Cultivar** – ‘Roma’
Plant Families

• Family classification based on
  – Shared morphological characteristics (flowers, fruits, leaves)

• Family \(\rightarrow\) genus \(\rightarrow\) species
  – Broad \(\rightarrow\) more in common \(\rightarrow\) most in common

• Cultivar (Contraction of cultivated variety)
Plant Families

• Why study/know plant families?
  – Common growth requirements
  – Similar cultural practices
  – Same disease and insect pests
Family Groups and Growth Habits

- Perennial Vegetables
- Starchy Crops
- Root Crops
- Legumes
- Bulb Crops (Alliums)
- Salad Crops
- Greens
- Cucurbitas
- Cole Crops
- Solanaceous
Classification of Vegetables
By Parts Used

• Flowers—cauliflower, broccoli, and artichoke
• Pods and seeds—green beans, peas, and lima beans
• Sprouts—soybeans and alfalfa
• Vegetable fruits—tomatoes, eggplant, squash, okra, peppers, and cucumbers
Classification of Vegetables
By Parts Used

• Roots—sweet potatoes, beets, carrots, parsnips, and turnips
• Tubers or underground stems—potatoes
• Bulbs—onions, garlic, and leeks
• Stems—celery, rhubarb, and asparagus
• Leaves—lettuce, spinach, and cabbage
Vegetable Classification

- Bulb -

- Flowers -
Vegetable Classification cont.

- Fruits -
- Leaves -
Vegetable Classification cont.

• Seeds -

• Tuber -
Vegetable Classification cont.

• Roots -

• Stem -
Perennial Vegetables

• Asparagus
• Rhubarb
• Horseradish
Asparagus spears
Asparagus
*Asparagus officinalis*

- Family: Liliaceae
- Type: Perennial
- Native: Europe and Western Asia
- America: Introduced in 1600s
- Folk Medicinal Use: Jaundice
Rhubarb  
*Rheum X hybridum*

- Polygonaceae family
- Is a vegetable but a New York court decided in 1947 it was used as a fruit so it was a fruit for duties
Rhubarb

• Cool Season Perennial
• Leaves are Poisonous
• Can be forced out of season
Horseradish
*Armoracea rusticana*

- Perennial cool season crop
- Can become a weed
- Root is consumed as relish
- Leaves can be cooked as greens
- Propagation: Root or rhizome cuttings
Horseradish

• Common to Orient and Europe
• Grown as a medical plant in Europe
• Romans consumed it as a sign of power
Sweet Corn

Zea mays
Sweet Corn

- Family: Poaceae
- Type: Annual grass
- Native: Central America <3500 B.C.
- America: 63 varieties by 1900
Root Crops

- Carrots
- Beets
- Radish

- Rutabaga
- Turnip
- Parsnip
- Sweet Potato
Root Crop Facts

- **Families:**
  - Apiaceae (carrot, parsnip)
  - Chenopodiaceae (beet)
  - Brassicaceae (turnip, rutabaga)
  - Convolvulaceae (sweet potato)
Sweet Potato

*Ipomea batatas*

- Family: Convolvulaceae
- Type: Tuberous root
- Native to Tropical America
- Second food only to white potato
- Warm season
- 140 frost free days
Carrots *Daucus carota var. sativus*

- Family Apiaceae (Umbelliferae)
- Originated in Afghanistan & possibly northern Iran & Pakistan
- Introduced in America in the 1700s
- Biennial, grown as an annual
- White, purple, yellow, orange, and red varieties
Carrot Pigments

- Beta carotene
- Anthocyanin
- Lycopene
- Xanthophyll
Cultivar Selection

- **Danvers**
  - Medium to long with broad shoulders and sharp taper
  - Orange tinged with green
  - Processed into baby food

- **Imperator**
  - More slender and slightly longer than Danvers type
  - Deep orange cortex with lighter core
  - Fresh Market

- **Nantes**
  - Short, cylindrical with no taper, and a blunt, rounded base
  - Bright orange
  - Primary home garden carrot

- **Chantenay**
  - Medium to short with a slight taper and blunt end
  - Grown for storage or processing
  - Medium to light orange
Radish
*Raphanus sativus*

- Family Brassicaceae
- Native to China
- Leaves deeply pinnate arising from a basal, edible, rosette
- Roots can be round, oval, cylindrical, or icicle-shaped
- Bolt under long day conditions
- Insect pollinated
Cultivar Selection

• Bred for taste, bolt resistance, disease resistance, & appearance

• Cultivars are based on season grown:
  - Spring-type
    • Cherry Belle
    • Early Scarlet Globe
  - Summer
    • French Breakfast
    • Snow Belle (white)
    • White Icicle (white)
    • Red Meat
  - Winter (var. longipinnatus)
    • April Cross
    • Round Black Spanish

• Daikons
  - Chinese White
  - China Rose
Beets

*Beta vulgaris*

- Family Chenopodiaceae (goosefoot family)
- Grown as roots and greens
- Native to western Europe & north Africa
- Selected from ancient European species
- Originally fed to livestock - mangels
- Biennial grown as an annual
- Contain betacyanin and betaxanthin
- High in carbohydrates
Cultivar Selection

- Based on color, shape & use:
  - Red, yellow, purple, white, striped
  - Top-shaped, globe-shaped, flattened, elongated
  - Slicing, bunching, storage
- Big Red
- Burpee Golden
- Chioggia (striped)
- Cylindra
- Detroit Dark Red
- Detroit Supreme
- Lutz
- Ruby Queen (bunching type)
Parsnip

Pastinaca sativa

- Mediterranean origin
- Long season crop
- Harvested in fall
- Roots withstand frozen soil...dig with a pick-axe
- Sold as bunches
Turnip

Brassica campestris

• Cool season crop 40 to 80 days
• Plant late summer for storage
• Does not tolerate heat
Rutabaga

*Brassica napus*

- Long season crop 85 to 95 days
- Good storage vegetable – 6 inch diameter root
- Bark color – purple, green, bronze, yellow or white
- Consume both roots and leaves
Legumes

• Peas
• Beans
• Soybeans
• Lima Beans
• Minor bean crops around the world
  – Dry beans, Runner beans, Broad beans, Asparagus beans, Winged beans, Yard long beans, etc.
Peas

*Pisum sativum*

- Family Fabaceae (Leguminoseae)
- Native to middle Asia
- Field peas are native to Africa
- Cool season, herbaceous annual
- Classified by growth habit, pod appearance, seed color, and starch/sugar content
Cultivar Selection

- **Snap or Edible Pod** – eaten when immature
  - Sugar Snap
  - Super Sugar Snap

- **Field Peas**
  - Black-eyed
  - Clay – grow well in clay soils
  - Crowder – “crowd” the peas in the pod
  - Iron – rusty red
  - Pink-eyed – pink central ring
  - White Acre
  - Zipper – unzip themselves from pod

- **Garden Peas**
  - Early Frosty
  - Maestro
  - Wando
  - Garden Sweet
  - Spring
  - **Snow Peas** – eaten when half mature
    - Mammoth Melting Sugar
    - Oregon Sugar Pod II
    - Snowbird
Beans
*Phaseolus vulgaris & P. linensis*

- Family Fabaceae (Leguminoseae)
- Native to Central America
- Warm season, herbaceous annual
Beans

*Phaseolus vulgaris* & *P. linensis*

- Family Fabaceae (Leguminoseae)
- Native to Central America
- Warm season, herbaceous annual
Cultivar Selection

• **Bush**
  - Erect plant, usually short season
  - Blue Lake
  - Bush Romano
  - Royal Burgundy (purple)
  - Goldmine (wax)

• **Lima**
  - Climbing or bush forms
  - Heat tolerant

• **Pole**
  - Twining type of bean, usually matures later but harvest time is longer
  - Kentucky Blue
  - Kentucky Wonder Wax
  - Scarlet Runner
Soybean

*Glycine max*

- Originated from the Orient
- Eat pods and leaves
- Pods are pubescent
- Hairless selections
- Consume seeds
Lima Beans
*Phaseolus limensis*

- Warm season crop
- Requires 4 months of frost free weather
- Sold as ‘Butter Beans’
- Sold shelled
Bulb Crops

• Onions
  - Fresh, storage, non-bulbing, potato, shallots
  - Scallions, walking onions

• Garlic

• Leek

• Chives

• Garlic Chives
Onions

*Allium cepa*

- Family Alliaceae
- Native to Southern Asia
- Introduced to America in the 1400s
- Herbaceous biennial grown as an annual
- Bulb is comprised of fleshy basal leaves
- Contains glucose, fructose, & sucrose – no starch
Cultivar Selection

- Green onions (**A. cepa**), immature true onions harvested before bulbs form
- Scallions or bunching onions (**A. cepa**) never form a bulb
- Multiplier onions form 4-5 bulbs enclosed in a single leaf sheath
- Shallots (**A. cepa**) develop a small cluster of bulbs and are more subtle in flavor
- Pearl onions (**A. ampeloprasum**) form only one storage leaf
- Cipollini onions are small, sweet, early onions
Garlic

*Allium sativum*

- Family *Alliaceae*
- Native to Middle Asia
- 1st cultivated 5,000 years ago
- Introduced to America in the 1700s
- Herbaceous, cool-season, perennial
- Comprised of multiple cloves
- Only hard neck varieties produce flowers
Cultivar Selection

• **Hard neck** –
  - Rocambole
    - Killarney Red
    - Spanish Roja
  - Purple Stripe
    - Chesnok Red
    - Siberian
  - Porcelain
    - Music
    - Northern White

• **Soft neck** –
  - Artichoke
    - California White
    - Inchelium Red
  - Silverskin
    - Silver Rose
    - Silver White

• **Elephant garlic is not a garlic but a form of leek!**
Leeks

*Allium ampeloprasum var. porrum*

- Family Alliaceae
- Native to the Mediterranean
- Herbaceous, cool-season biennial grown as an annual
- Non-bulbing unless daylength exceeds 19 hours
- Milder flavor than onions
Cultivar Selection

• Bred for size and shape of the stalk, hardiness, disease resistance, and early maturity
  - American Flag
  - Giant Musselburg
  - King Richard
  - Otina
  - Pancho
Salad Crops

*Eaten fresh, uncooked*

- Lettuce
- Celery
- Swiss chard
- Parsley
- Endive
- Chicory
- Dandelion
Lettuce
\textit{Lactuca sativa}

- **Family:** Asteraceae
- **Type:** Herbaceous Annual
- **Native:** Mediterranean Basin
- **America:** a long time
- **Folk Medicinal Use:** lactucopicrin
Cultivar Selection

• **Loose-leaf (var. crispa)**
  - Easiest to grow & 1st to mature
  - Salad Bowl
  - Green Ice
  - Prizehead
  - Simpson Elite
  - Royal Oakleaf

• **Romaine (Cos) (var. longifolia)**
  - Torpedo-shaped heads
  - Matures later than butterhead and leaf varieties
  - Cimmaron
  - Giant Caesar
  - Parris Island Cos
  - Athena
  - Rouge d’ Hiver
Celery

*Apium graveolens*

- Common to marshlands of the Mediterranean
- Set out as transplants
- Blanch (cover) for quality
- Bitter taste
- 110 days
Chicory
*Cichorium endivia*

- Native to Europe, Naturalized many areas
- Known as Belgian endive
- Leaves eaten as a salad crop
- Roots roasted and used as a coffee substitute
Greens
(Leafy Vegetables Eaten Cooked)

• Spinach
• New Zealand Spinach
• Mustards
• Beet tops
• Swiss chard

• Kale
• Collards
Spinach

*Spinacia oleracea*

- Family Chenopodiaceae (goosefoot family)
- Native to Iran
- Spina means “spiny” in Latin to describe prickly seed.
- Hardy, cool-season annual
- High in vitamins A & C, calcium, iron, & potassium
Spinach Cultivars

• Based on leaf texture
  – Savoy
    • Avon
    • Bloomsdale Long-Standing
    • Melody
  – Smooth
    • Baby Leaf
    • Giant Nobel
    • New Zealand
    • Olympia
    • Space
    • Tyee
    • Viroflay
    • Whale
Collards

*Brassica oleracea* (Acephala Group)

- Various loose-leafed cabbage species cultivars
- Native to Europe
- Large, dark-colored, edible leaves
- Sometimes used as an ornamental
Swiss Chard

*Beta vulgaris cicla*

- Native to Europe
- Related to garden beets but leaves are eaten
- Bright colored cultivars
Cucurbits

- Cucumbers
- Melons
- Cantaloupe

- Pumpkins
- Squash
- Winter Squash
- Summer Squash
- Zucchini
Cucumber
*Cucumis sativus*

- Family Cucurbitaceae
- Native to India
- Warm season, herbaceous annual
- May be determinate or indeterminate
- Leaves and stems are spiny
- Leaves are triangular with rounded lobes with the middle lobe longer
- Self-pollinated

- Cucurbitacin is what causes people to have difficulty digesting cucumbers
- Gynoecious – all female Need $\geq 1$ male plant to pollinate
- Parthenocarpic – self-fertile & doesn’t require pollination
  - Requires isolation from other fruit to avoid pollination to provide seedless fruit
Summer Squash
Cucurbita pepo

- Family Cucurbitaceae
- Native to the Americas
- Warm season, tender, herbaceous annual
- May be determinate or indeterminate
- Leaves are 3-lobed or entire
- Plants are monoecious
- Thin-skinned, eaten when immature
- Blossoms are edible
Cultivar Selection

- **Zucchini**
  - Aristocrat
  - Spineless Beauty
  - Roly Poly

- **Straightneck**
  - Butterstick
  - Gold Bar
  - Sunray
  - Saffron

- **Crookneck**
  - Horn of Plenty
  - Pic-n-Pic
  - Early Golden Crookneck

- **Scallop or Patty Pan**
  - Scallopini
  - Butter Scallop
  - Peter Pan
Winter Squash
*Cucurbita maxima, pepo, moschata*

- Family Cucurbitaceae
- Native to Americas
- Warm season, herbaceous annual
- May be determinate or indeterminate
- Leaves are 3-lobed or entire
- Plants are monoecious
- Can cross pollinate with other cultivars of the same species
- Hard rinds make them good for storage
Cultivar Selection

- **Acorn** (*C. pepo*)
  - Green or gold & deeply ribbed
  - Cream of the Crop
  - Ebony Sweet Acorn
  - Table Ace
  - Table Queen

- **Buttercup** (*C. maxima*)
  - Medium-dark green splotched with grey
  - Autumn Cup

- **Butternut** (*C. moschata*)
  - Orange flesh, tan skin, bulbous base
  - Autumn Glow
  - Early Butternut
  - Waltham

- **Delicata** (*C. pepo*)
  - Cornell's Bush Delicata

- **Hubbard** (*C. maxima*)
  - Medium, blue-gray with bumpy skin
  - Blue Hubbard

- **Kabocha** (*C. maxima*)
  - Ambercup
  - Sweet Mama

- **Spaghetti** (*C. maxima*)
  - Oval with golden yellow skin
  - Pasta Hybrid
  - Vegetable Spaghetti

- **Turk's Turban** (*C. maxima*)
  - Green, turban-shaped, striped with red, white, & orange
Cucurbit Taxonomy

**Cucurbita pepo**
- Acorn
- Delicata
- Jack-o-lantern
- Pie pumpkins
- Patty pan squash
- Small gourds
- Summer squash
- Zucchini

**Cucurbita maxima**
- Banana
- Buttercup
- Hubbard
- Large gourds
- Turk’s turban
- Huge pumpkins

**Cucurbita moschata**
- Butternut
Pumpkins
*Cucurbita pepo* (Jack-O-Lantern & pie), *maxima* (giants)

- Family Cucurbitaceae
- Native to Americas
- Warm season, frost-tender, herbaceous annual
- May be determinate or indeterminate
- Leaves are 3-lobed and may be deeply indented
- Plants are monoecious
- Can cross pollinate with other cultivars of the species
- Mammoth pinkish-orange pumpkins are related to Hubbard squash
Cultivar Selection

- Based on
  - Shape
  - Size
  - Color
  - Flesh quality (pie)
Zucchinis
Cole Crops

*Brassica oleracea*

- Cabbage
- Cauliflower
- Broccoli
- Brussel Sprouts
- Kale
- Collards
- Mustards
- Chinese Cabbage
- Kohlrabi
Cabbage  *Brassica oleracea var. capitata*, *tuba*, & *sabauda*

- Family Brassicaceae (Cruciferae)
  - Native to Europe & Asia
  - Hardy, cool season herbaceous biennial
  - First to evolve from wild mustard
  - Heads pointed, conical, oblong, round, or flattened
  - Alaskan-grown cabbage heads may be 60lbs each!
  - Isothiocyanates give cole crops their distinct flavor
Cultivar Selection

- Cultivars based on color and type
- Savoy Express (savoy)
- Ruby Perfection (red)
- Earliana (early green)
- Salad Delight (red)
Broccoli

*Brassica oleracea var italica*

- Family Brassicaceae (Cruciferae)
- Native to Europe & Asia
- Hardy, cool season, herbaceous annual
- Head comprised of functional flower buds
- Sprouting & heading varieties
Cauliflower

Brassica oleracea var. botrytis

- Family Brassicaceae (Cruciferae)
- Native to Europe & Asia
- Hardy, cool season herbaceous biennial
- Evolved from sprouting broccoli
- Winter and late-season types have curds consisting of functional flower buds
Other Cole Crops

- Brussels sprouts—
  * B. oleracea var. gemmifera
- Kale—
  * B. oleracea var. acephala
- Kohlrabi—
  * B. oleracea var. gongyloides
- Chinese Cabbage—
  * B. oleracea var. pekinensis
- Bok Choy
Kohlrabi

*Brassica oleracea* var. *gongylodes*
Solanaceous

- Tomato
- Pepper
- Eggplant
- Husk Tomato or tomatillo
- Potato
Tomatoes
*Lycopersicon esculentum*

- Family Solanaceae
- Native to the Andes of South America
- Introduced to Europe in 1500s
- Believed to be poisonous until 1700s
  - Tomatine in green tissue
- Tender, warm season annual
Peppers

*Capsicum annuum, C. frutescens* - Tabasco

- Family Solanaceae
- Originated in Central America
- Came to United States in 1700's
- Black & white pepper used as seasoning is *Piper nigrum*
- Tender, herbaceous perennials grown as annuals
- Lance-shaped leaves & perfect, white flowers
Cultivar Selection-Hot

- **Anaheim** = 500-2,500
  (mild, chile rellenos)
  - **Ancho/Poblano** = 1,000-1,500
    (mild, roasted, stuffed, mole)
  - **Cayenne** = 30,000-50,000
    (medium hot, Cajun & Indian food)
  - **Habañero** = 150,000-300,000
    (hottest of all, salsas & hot sauces)
  - **Jalapeno** = 2,500-5,000
    (medium hot, salsas & salads)
  - **Pequin** = 50,000-100,000
  - **Serrano** = 10,000-20,000
    (fiercely hot, roasted for salsa)
  - **Thai** = 30,000-100,000
    (fiercely hot, Asian stir fry)
Cultivar Selection - Sweet

- **Sweet**
  - Bell
    - Early Crisp
    - Gypsy
    - Lady Bell
    - Purple Beauty
  - Banana
    - Banana Supreme
    - Bananarama
  - Cherry
    - Cherry Pick
  - Cubanelle
    - Key Largo
  - Hungarian
  - Pimienta
    - Antohi Romanian
    - Round of Hungary
    - Red Ruffled Pimiento
  - Tabasco
Eggplant

*Solanum melogena*

- Family Solanaceae
- Tender, warm-season perennial grown as an annual
- Native to India & China – ancient Asian vegetable
- America: Introduced early as ornamental
Potato
Solanum tuberosum
Potato Facts

• Family: Solanaceae
• Type: Tuberous perennial
• Native: America
• Folk Medicinal Use: pimples and burns
More History

- 150 Species in South America, Forage Crop
- Became the main crop of Tribal people
- *S. tuberosum* appeared in Spain about 1565
- In 1771, at a Botanical Conference in France, the potato was selected as a crop to replace wheat in the event of a famine
Potatoes in Ireland

• 1800-1840 Population increased from 4 million to 8 million
• 1845 A seven degree cooler and wet summer: potatoes diseased and turned to mush in storage
• 1846 Same weather cycle: ¼ population on welfare
• 1847 One million starved, 2 million moved
The End