

Classification of vegetable crops

Definition of vegetable crops

Vegetable crops are plants which are

- herbaceous,
- (usually) intensively cultivated,
- used for food in raw or slightly processed forms,
- of high nutritive value, rich in bioactive components.

Disputable cases

strawberry, melons, starchy tuber crops, edible leguminous crops, sweet and pop corns, squashes, alliums, chillies and other spices, mushrooms

Classification of vegetable crops

Classifications of vegetable crops

- There are over 200 (250) crops worldwide
- There are 48 crops on the EU's variety list
- 56 are appearing in Hungarian textbooks
- Some kind of classification is useful
 - botany
 - consumed plant part
 - number of seasons a plant may live
 - centres of origin
 - climatic requirements

Botanical classification

- **Dicotyledonous plants**
- **Amaranthaceae**: table beet, spinach, Swiss chard, amaranth
- **Polygonaceae**: rhubarb, sorrel
- **Cucurbitaceae**: watermelon, melon, cucumber, loofah, chayote, pumpkin, squash, bitter melon, bottle gourd
- **Brassicaceae**: cole crops: cauliflower, broccoli, cabbage, etc., Chinese cabbage, pak choi, mustard green, turnip, radish, horse radish, rocket
- **Malvaceae**: okra
- **Euphorbiaceae**: cassava
- **Fabaceae**: pea, bean, yardlong bean, broad bean,
- **Apiaceae**: carrot, celery (celeriac, smallage), parsley, parsnip, fennel, chervil, culantro
- **Valerianaceae**: corn salad

Botanical classification

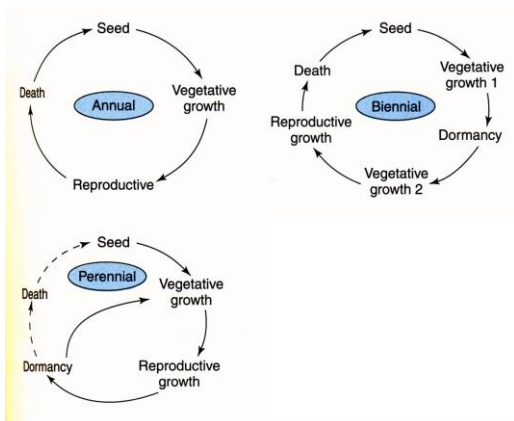
- **Solanaceae**: potato, tomato, pepper, eggplant, pepino, tomatillo
- **Convolvulaceae**: sweet potato, water spinach
- **Asteraceae**: lettuce, endive, chicory, artichoke, cardoon, black salsify
- **Monocotyledonous plants**
- **Asparagaceae**: asparagus
- **(Alliaceae) Amaryllidaceae**: onion, garlic, leek, shallot, Japanese bunching onion, chives, garlic chives
- **Dioscoraceae**: yam
- **Poaceae**: sweet corn, popcorn
- **Araceae**: taro, yautia

Classification based on consumed plant part I

- **Starchy tubers:** potato, sweet potato, cassava, yam, taro, yautia
- **Root:** table beet, carrot, celeriac, parsley, turnip, radish
- **Leaf blade and/or petiole:** spinach, celery, parsley, pak choi, mustard green, lettuce, chicory, endive, pak choi, (leek, Japanese bunching onion)
- **Bulb:** onion, garlic, shallot
- **Shoot:** water spinach, asparagus
- **Bud:** cabbage, Chinese cabbage, (chicory)

Practical grouping

- **Potherbs or greens:** spinach, water spinach,
- **Salad crops:** lettuce, endive, chicory, celery, Chinese cabbage, pak choi
- **Cole crops:** cabbage, cauliflower, broccoli
- **Root crops:** carrot, celeriac, parsley, radish, turnip, table beet
- **Bulb crops/Alliums:** onion, garlic, leek, shallot, Japanese bunching onion
- **Pulses/legumes:** peas, beans, yard long bean
- **Cucurbits:** watermelon, melon, cucumber, squash, pumpkin, wax gourd, chayote, bitter gourd, loofah
- **Solanaceous fruits:** tomato, pepper, eggplant
- **Others:** asparagus, okra, sweet corn
- **Starchy tuber crops:** potato, sweet potato, cassava, yam, taro, yautia



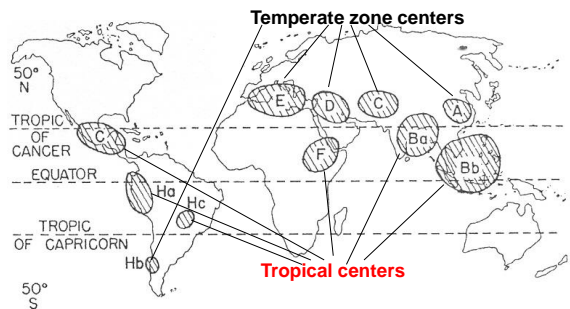
Classification based on consumed plant part II

- **Immature inflorescence:** cauliflower, broccoli, artichoke
- **Fruit:**
 - **immature:** pepper (green), eggplant, cucumber, squash, wax gourd, bottle gourd, bitter gourd, loofah, chayote green pea, green bean, okra, sweet corn
 - **mature:** tomato, pepper (red), watermelon, (melon), pumpkin, wax gourd, popcorn
- **Seed:** green pea, bean

Classification based on number of seasons a plant may live

- **Annual:** completes its life cycle in one growing season
 - solanaceous crops, cucurbits, pulse crops, okra, sweet corn, cauliflower, broccoli, Chinese cabbage, radish, spinach, lettuce
- **Biennial:** completes its life cycle in two growing seasons
 - cabbage, turnip, Apiaceae crops (most of them), table beet
- **Perennial:** lives, flowers and fruits for a number of years
 - alliums, asparagus, artichoke

World centres of origin of cultivated plants according to Vavilov



Centers of temperate zone:

Chinese center (A): radish, chinese cabbage, wax gourd, mustard green, (yard long bean ?)

Central Asiatic center (C): pea, onion, garlic, spinach, carrot, Japanese bunching onion

Mediterranean center (D): table beet, cole crops, turnip, lettuce, chicory, endive, celery, parsley, asparagus, artichoke, shallot, leek

Chile centre (Hb): potato

Cool season, slightly frost tolerant plants, usually lower water and radiation requirements

Centers of tropical zone:

Indian and Malaysian center (Ba): eggplant, cucumber, melon, taro, yam, bitter gourd, loofah, water spinach

Ethiopian center (F): okra, watermelon; **Africa:** bottle gourd, yam

South-Mexican and Central-American center (G): corn, common bean, pumpkin, chayote, sweet potato, yautia, pepper

Ecuador, Peru and Bolivia centers (Ha): potato, pepino, tomato, pumpkin, pepper

Brasilian center (Hc): cassava

Warm season, frost sensitive plants, usually higher water and radiation requirements

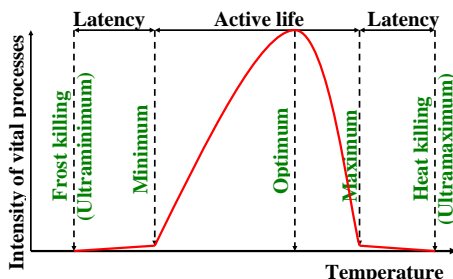
Photoperiodism of vegetable crops

PHOTOPERIODISM: The flowering response of plants to the relative length of day or night.

- **short-day plants** – Flowers are produced when the photoperiod is less than a critical maximum. (e.g. soybean, sweet potato; tuber initiation of potato)
- **long-day plants** – Flowers are produced when the photoperiod is greater than a critical minimum. (e.g. lettuce, spinach, radish, Chinese cabbage; bulbing of onion)
- **day neutral plants** – Flowering is not effected by photoperiods. (e.g. tomato, pepper, eggplant, most cucurbits, bean)

Thermoclassification of vegetables based on their climatic ranges (MacGillivray, 1953)

- **Cool season crops**
 - optimum 16-18°C, intolerant to monthly mean above 24°C, some tolerance to freezing: spinach, beet, turnip, cabbage, radish, broccoli
 - the same, but damaged by freezing: cauliflower, pea, celery, carrot, lettuce
 - optimum 18-30°C, tolerant of frost: onion, asparagus
- **Warm season crops**
 - optimum 18-30°C, intolerant of frost: sweet corn, bean, tomato, pepper, cucumber, melon, squash
 - long season, will not thrive below 21°C: watermelon, eggplant, okra

Effect of temperature on the intensity of vital processes and the cardinal temperatures**Thermoclassification of vegetables based on their optimal temperature value (Markov-Haev, 1953)**

- **Cool season crops; cold tolerant crops**
 - 13°C: cole crops, radish
 - 16°C: potato, pea, carrot, parsley, lettuce, chicory, endive, spinach
 - 19°C: table beet, celery, onion, garlic, leek, asparagus
- **Warm season crops; warm liking crops**
 - 22°C: tomato, pepper, eggplant, pumpkin, bean, sweet corn
 - 25°C: watermelon, melon, cucumber, squash