

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 roots and tubers
- Edible leguminous crops
- Sweet corn and popcorn
- Squashes
- Alliums
- Chillies and other spices
- Mushrooms

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 essential
 - botany
 - consumed plant part
 - number of seasons a plant may live
 - centres of origin
 - climate requirements, environmental factors (temperature, water, soil)

Botanical classification

- **Dicotyledonous plants**
- **Amaranthaceae**: spinach, garden beet, Swiss chard, amaranth
- **Polygonaceae**: rhubarb, sorrel
- **Cucurbitaceae**: watermelon, melon, cucumber, bur gherkin, loofah, chayote, pumpkin, squash, bitter gourd, malabar gourd
- **Brassicaceae**: cole crops, Chinese cabbage, pak choi, turnip, radish, horse radish, cress
- **Malvaceae**: okra
- **Euphorbiaceae**: cassava
- **Fabaceae**: pea, bean, broad bean, peanut, yardlong bean
- **Apiaceae**: carrot, celery, parsnip, parsley, fennel, chervil, culantro
- **Valerianaceae**: corn salad

Botanical classification II

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

Classification based on consumed plant part I

- **Starchy tubers:** potato, sweet potato, cassava, yam, taro
- **Root:** carrot, celeriac, parsley, parsnip, radish, turnip, horse radish, garden beet, salsify
- **Leaf blade and/or petiole:** lettuce, chicory, endive, cardoon, spinach, swiss chard, rhubarb, sorrel, fennel, chervil, parsley, smallage, pak choi, cress, rocket salad, corn salad, chive (leek, Japanese bunching onion)
- **Bulb:** onion, garlic, shallot
- **Modified stem:** kohlrabi (radish)
- **Shoot:** asparagus

Practical grouping I

- **Potherbs or greens:** spinach, chard, sorrel, cress, rocket salad, corn salad, chervil, chives, water spinach, kale
- **Salad crops:** lettuce, endive, chicory, celery, fennel, Chinese cabbage, pak choi
- **Cole crops:** cabbage, kohlrabi, Brussels sprouts, kale, kohlrabi, cauliflower, broccoli
- **Root crops:** carrot, celeriac, parsley, parsnip, radish, turnip, horse radish, garden beet, salsify
- **Bulb crops/Alliums:** onion, garlic, leek, shallot, chives, Japanese bunching onion
- **Pulses/legumes:** peas, beans, horse bean, yard long bean

Classification based on number of seasons a plant may live

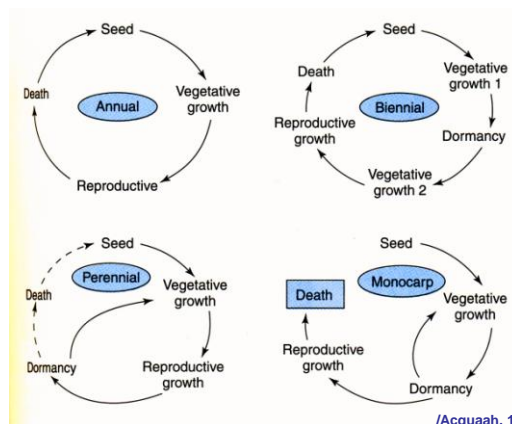
- **Annual:** completes its life cycle in one growing season
- **solonaceous crops, cucurbits, pulse crops, okra, sweet corn, cauliflower, broccoli, Chinese cabbage, radish, spinach, lettuce**
- **Biennial:** completes its life cycle in two growing seasons
- **cabbage, kohlrabi, Brussels sprouts, kale, turnip, Apiaceae crops (most of them), garden beet, Swiss chard,**
- **Perennial:** lives, flowers and fruits for a number of years
- **alliums, asparagus, horse radish, rhubarb, sorrel, salsify, artichoke**

Classification based on consumed plant part II

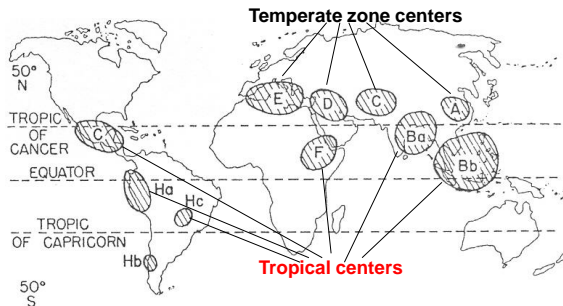
- **Bud:** cabbage, Brussels sprouts (chicory)
- **Immature inflorescence:** cauliflower, broccoli, artichoke
- **Fruit:**
 - **immature:** pepper, eggplant, cucumber, squash, green pea, green bean, okra, sweet corn
 - **mature:** tomato, pepper, watermelon, (melon), pumpkin, popcorn
- **Seed:** green pea, bean, horse bean

Practical grouping II

- **Cucurbits:** watermelon, melon, cucumber, squash, pumpkin, chayote, bitter melon, loofah
- **Solanaceous fruits:** tomato, pepper, eggplant, pepino
- **Starchy tuber crops:** potato, sweet potato, cassava, yam, taro
- **Others:** asparagus, okra, sweet corn



World centres of origin of cultivated plants according to Vavilov



Centers of temperate zone:

Chinese center (A): radish, chinese cabbage, Japanese bunching onion

Central Asiatic center (C): pea, horse bean, onion, garlic, spinach, carrot

Mediterranean center (D): garden beet, cole crops, lettuce, chicory, celery, parsnip, rhubarb, asparagus

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

Centers of tropical zone:

Northeast India and Myanmar center (Ba): eggplant, cucumber, melon, taro, yam, yard long bean

Ethiopian center (F): garden cress, okra, watermelon

South Mexico and Central America center (G): corn, common bean, malabar gourd, winter pumpkin, chayote, sweet potato, pepper

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

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

Photoperiodism of vegetable crops

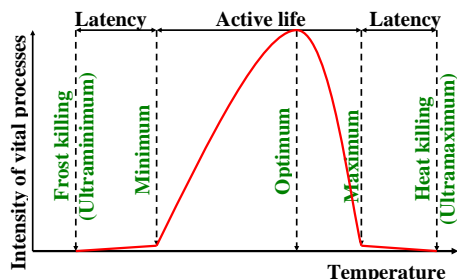
PHOTOPERIODISM: The flowering response of plants to the relative length of day or night.

- **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, parsnip, turnip, cabbage, radish, broccoli
 - the same, but damaged by freezing: cauliflower, pea, Swiss chard, 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, horse radish
 - 16°C: potato, pea, carrot, parsley, lettuce, chicory, sorrel, spinach, rhubarb
 - 19°C: garden 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