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
- Dioscoreaceae: 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

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 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

Practical grouping II

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

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, 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

[Acquash, 1999]
World centres of origin of cultivated plants according to Vaviliov

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

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