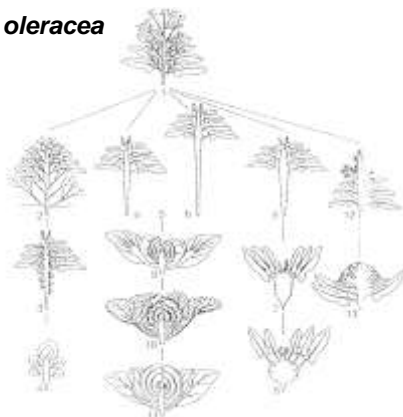


Characteristics of cole crops and their cultivation

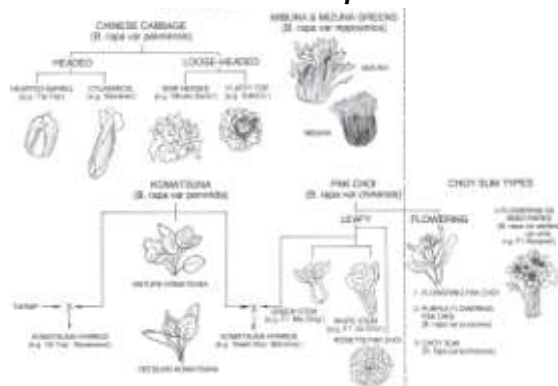
Taxonomy and origin

- **Brassicaceae** family (300 genera, 3000 species) – mainly annuals and biennials from the temperate zone
- **Brassica** genus (40 species – 6 cultivated)
- **Brassica oleracea** - cole crops
- 7 groups: *acephala* – kale, *alboglabra* – chinese broccoli, *botrytis* – cauliflower, *capitata* – cabbage, *gemniferae* – brussels sprouts, *gongyloides* – kohlrabi, *italica* – broccoli
- Originated from the Mediterranean basin. First used as medicinal crop; present forms evolved from the XVth century.
- **Brassica rapa** (10 groups)
- originated from the Eastern Mediterranean basin?, Central-Asia?, China ?

Brassica oleracea



Brassica rapa



Nutritive values and usage

- good source of various nutrients, high ANV values
- relatively high amount of proteins (Savoy cabbage, Brussels sprouts, broccoli)
- high fibre content
- sugar content – cabbage used for sauerkraut
- bioactive compounds: vitamin C, vitamin U(metil-metionin), flavonoids, glucosinolates → cancer preventing attributes
- the consumed part varies with the botanical group: large terminal bud – cabbage; axillary buds – Brussels sprouts; immature, fleshy inflorescence (curd) - cauliflower, broccoli; bulblike stem – kohlrabi, leaf - kale
- rarely consumed raw, usually cooked
- processing: fermentation (sauerkraut) - cabbage, pickling, canning – kale, freezing – cauliflower, broccoli, Brussels sprouts

Importance

- Important field crops throughout the world; also grown in plastic tunnels for enhancing earliness
- **Cabbages and other brassicas**
- **World:** 2.5 M ha; 71 M t; 29 t/ha
- China 48%, India 12%, Russia 5%
- **EU:** 158 th. ha; 5 Mt, 31 t/ha
- Poland 22%, Rumania 20%, Germany 14%
- **Cauliflower and broccoli**
- **World:** 1.3 M ha; 25 M t; 19 t/ha
- China 41%, India 33%, Italy 2,4%
- **EU:** 130 th. ha; 2.3 Mt, 17.5 t/ha
- Spain 26%, Italy 17%, France 13%

Morphology

- annuals or biennials, grown as annuals; the consumed part varies with the species
- **Root system:** moderately shallow
- **Shoot:** very short unbranched – cabbage; short, thick – cauliflower; elongated, unbranched – broccoli; erect unbranched stems – kale; short, tuber like - kohlrabi
- **Leaf:** thick, leathery, glaucous, waxy
- **Inflorescence:** elongated raceme
- **Flower:** hermaphrodite, four petals, usually yellow, self-incompatible, insect pollinated
- **Fruit:** pod like fruit called a silique
- **Seed:** small, round, dark brown, 3-6 g

Ecological needs

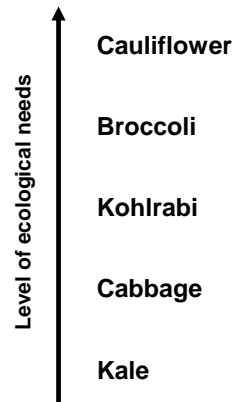
- **Light:** moderate need; long-day plants; discoloration due to sunlight - cauliflower
- **Temperature:** germination and growth optimum is 15-20°C; above (25)-30°C growth is suppressed, quality is decreased; they are frost tolerant, some crops overwinter; cold exposure (vernalization – under 10°C) is required for flowering
- **Water:** uniform level of water is required, up to 4 mm/day; uneven water supply can result head bursting (cabbage), tuber cracking (kohlrabi)
- **Soil:** fertile, sandy or silty loams for early, heavy soils for late crop; pH 6-8; considerable differences in salt tolerance among the species
- **Nutrients:** utilize large quantities of nutrients; favour manuring; excessive N delays maturation

Field production I

- **Crop rotation:** on alkaline soil monoculture is possible
- **Propagation:**
- **Direct seeding:** 1-2 cm deep
- **Transplanting:** mainly plug transplants, 4-6 weeks old
- row distance is between 40-90 cm, in row distance is 15-60 cm, plant density is 20 (Brussels sprouts) - 160 (kohlrabi) thousand plants/ha
- **Irrigation:** soil water level should be maintained between 70-80% of field capacity
- **Weed control:** mechanical cultivation (or selective herbicides), especially during the early growth

Classification of cultivars

- Important commodity variables:
 - maturity period (early, intermediate, late cultivars)
 - size
 - density, compactness – cabbage, cauliflower, broccoli
 - surface texture - cauliflower
 - shape
 - colour
 - leaf texture – cabbage, kale
- maturity period ↔ size ↔ usage
- leaf texture ↔ usage



Field production II

- **Harvest:**
 - from 50 days after planting (kohlrabi, early cabbage) until 180-200 days (late maturing Brussels sprouts)
 - cabbage – at desired head firmness
 - cauliflower, broccoli – before the loss of compactness,
 - kale – adequate leaf size
- **for fresh market:** usually smaller size; hand harvest; frequency: from 1-2 harvests (kohlrabi, cabbage) up to 4 months harvest period (Brussels sprouts)
- **for processing** – usually bigger size; mechanical (cabbage, Brussels sprouts) or hand (cauliflower, broccoli) harvest
- **Post-harvest:** cabbage, kohlrabi storable for long period, others up to just 3-4 weeks; 0°C, 98% rh