

## Main characteristics and cultivation of salad crops

lettuce (L), endive (E), chicory (C)

### Taxonomy and origin

- *Asteraceae* family (the largest dicotyledonous family)
  - *Cichorioideae* subfamily
    - *Lactuca* genus (about 100 species)
      - *Lactuca sativa* - its progenitor is probably *L. serriola*; domesticated in the eastern Mediterranean area (stem→cos→ head and leaf types)
    - *Cichorium* genus (9 species)
      - *Cichorium endivia* – originates from Sicily (?)
      - *Cichorium intybus* – originated from the Mediterranean basin

### Usage

- Mostly the leaves are consumed in raw form, in salads and in sandwiches
- Growing importance of value added products (premixes, mesclum)
- Chicory is sometimes cooked
- Elongated, thick stem of the lettuce and etiolated apex bud (chicon) of chicory is also consumed
- Lettuce also used as an oil crop in Egypt
- Chicory root is used as a substitute for coffee
- Their processing is not of great importance

### Morphology

- Annual (L, E), biennial (E) or perennial (C) plants
- **Root system:** thick taproot, dense lateral root formation near the surface
- **Stem:** shortened, short internodes
- **Leaf:** spirally arranged on the stem, forming a rosette, later can form a head; broad and long leaf types; can be of different colours
- **Inflorescence:** a corymbose panicle, composed of many capitula
- **Floret:** ray type, perfect, self-pollinated (L, E) or cross-pollinated (C); yellow (L), purplish (E), blue (C)
- **Fruit (seed):** achene – black, grey, white, brown, yellow

### Nutritional value

- Fairly good sources of vitamin C, pro-vitamin A
- High mineral content (Ca, Fe)
- Good sources of dietary fibres
- Very low calorie content
- Bioactive compounds: bitter materials - lactucin, lactucopicrin; chlorogenic acid – anticarcinogenic properties; some types are containing anthocyanins; inulin in the chicory root (17%)
- They can accumulate nitrate in high amounts (1258/2011 EC)
- Outer leaves are more nutritious than inner ones; cos and leaf types are more nutritious than head types; chicory and endive are more nutritious than lettuce

### Importance

- They are mainly grown in temperate and subtropical regions
- Chicory and endive are mainly used in Western- and Mediterranean-Europe
- Important crops in protected cultivation too
- **World:**
  - 1,22 M ha, 26,8 M t, 21,9 t/ha
  - China 55%, USA 18%
- **EU:**
  - 120 thousand ha, 2,84 M t, 23,7 t/ha
  - Spain 33%, Italy 26%, Germany 12%, France 8%

### Classification of cultivars

- **Based on the nature of the consumed part:**
  - **Lettuce:** stem; cos (romain) – elongated head; crisphead (iceberg) – firm, spherical head, good shelf-life; batavia – head is less dense; butterhead; latin (grassé); leaf (cutting) (lollo, oak-leaved, salanova etc.)
  - **Endive:** escarole - broad-leaved; frisée - narrow-leaved, the leaves are frilled
  - **Chicory:** rosette; witloof (forced stage of the rosette type); heading types (radicchio: chioggia, treviso, sugarloaf)
- **Based on their growing season:**
  - summer and winter (spring, autumn) types

### Ecological needs

- **Light:** long-day plants, daylength↔cultivar choice, germination can be inhibited in the dark
- **Temperature:** cool season crops; optimum for germination is 18-21°C (L); thermodormancy; for growth 18-25°C daytime and 10-15°C night time T is optimal; high temperature promotes bolting
- **Water:** supplementary irrigation is usually necessary
- **Soil:** requires good soils, friable and clod-free; tolerant to pH, sensitive to salinity
- **Nutrients:** sufficient N supply is crucial; P availability effects early growth; Ca deficiency causes tipburn (L), brownheart (E) and internal browning (C)

### Production method I

- **Crop rotation:** suitable for double or multi cropping systems
- **Tillage:** preparing a clod-free soil, (bed formation, plastic mulching)
- **Propagation:** mostly transplanted at the 3-4-leaf stage, mainly plug transplants are used; avoid deep planting; row and within row distances are 30-40 cm
- **Weeding:** preplant herbicide application, than mechanical weeding
- **Irrigation:** supplementary irrigation is usually necessary; furrow, sprinkler and drip irrigation are all can be used
- **Fertilization:** manure is usually not used

### Production method II

- **Harvest:** requires 30-90 days (leaf, butterhead→cos→crisphead) until the vegetative maturity depending on the type and the season
- usually cut by hand; two or more harvests at intervals of several days, rarely they can be harvested in one pass through the field
- once-over mechanical harvest (NL, USA) requires a very uniform field
- **Post-harvest:** (washed and spin dried)
- rapid packing and cold-chain are essential; field packing was a usual practice once, nowadays filmwrapping or bagging at the shipping point is a more common practice
- stored at 0°C and 98% rh