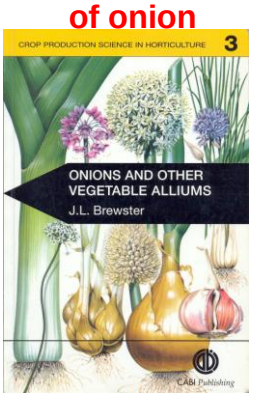
Main characteristics and cultivation of onion



Taxonomy and origin

- ❑ ***Alliaceae*** **family –**
- ➢ ***Allium*** **genus (about 500 species) – low growing perennials of the temperate and boreal zones of the northern hemisphere**
- **– 7 cultivated *Allium* species – Originated from the mountainous region of central Asia**
- • ***Allium cepa*** **– its progenitor is not known**
- **– Common onion group (onion) – large single bulb**
- **– Aggregatum group (shallot) – cluster of smaller bulbs**

Nutritional value

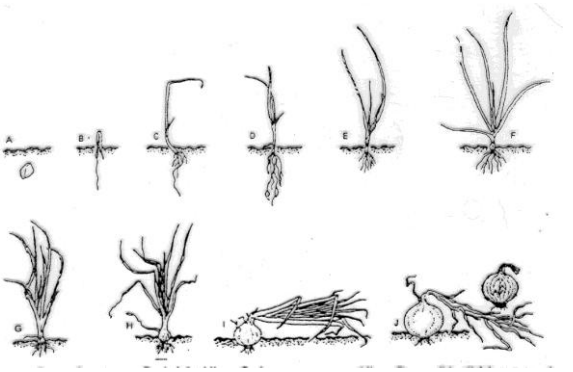
- **Soluble solid (5)-7-15-(20)%, mainly sugars and fructans (polymers of fructose) – 5-12%**
- **Protein, fat and fibre contents are low**
- **Green onion tops are rich in vitamin C and pro-vitamin A**
- **Sulphur containing compounds (e.g. allyl sulfide) → smell, pungency, Medicinal attributes**
- **Mainly used as cooked vegetable and flavouring ingredients; also consumed raw in salads**
- **Processed in many ways: canned, pickled (usually small bulbs), frozen, dehydrated (from white-fleshed and white-skinned cultivars having high solid content)**

Importance

- **Onion - important vegetable worldwide**
- **Shallot – much less economic importance mainly produced by small scale growers**
- **Onion, dry**
- **World: 5.0 M ha, 93 M t, 19 t/ha**
- **China 26%, India 21%, Egypt 3.3%, USA 3.3%**
- **EU: 191 th. ha, 6.5 M t, 34 t/ha**
- **The Netherlands 22%, Spain 19%, Poland 10%**
- **Onion, green**
- **World: 253 th. ha, 5.7 M t, 23 t/ha**
- **China 16%, Niger 12%, Japan 9.6%, Mali 9.3%**
- **EU: 14 th. ha, 730 th. t, 52 t/ha**
- **Greece 57%, Germany 13%, Portugal 9,6%**

Morphology

- **A perennial plant cultivated as an annual**
- **Root system: shallow; adventitious roots - thick, usually unbrunched and without root hairs**
- **Stem: below soil level, flattened to form a disc**
- **Leaf: consists of a blade and a sheath – forms a tube; blade is coated by a waxy cuticle**
- **Bulb: formed by tubular swollen leaf sheaths, the outer sheaths develop into dry protective skins**
- **Inflorescence: a spherical umbel (up to 15 cm in diameter) situating on a 1-2 m high hollow stalk (scape); contains 200-600 flowers**
- **Flower: white, perfect, insect pollinated**
- **Seed: black, irregularly shaped, 3 g thousand seed weight**



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Classification of cultivars

- **Based on daylength requirement for bulb development: short (11-12 h), intermediate (13-14 h), long (16 h)**
- **Based on cultivation method: autumn sown cultivars, overwintering cultivars, cultivars grown from sets**
- **Based on bulb shape: globe, flattened globe, spindle-like, cylindrical, high shoulder**
- **Based on bulb skin colour: white, yellow, light brown, brown, dark brown, red, purple, green**
- **Based on flesh colour: white, yellow, purple**
- **Based on maturity period**
- **Based on usage: salad onions, for long-term storage, for dehydration, for pickling**
- **Some famous types: Bermuda, Dutch Rijnsburger, Grano, Granex**
- **Dry matter content ↔ pungency, usage, storability**

Ecological needs I

- **Light: likes full light, critical day-length for bulbing induction**
- **Temperature: cool season crop, have some frost (sometimes freezing) tolerance;**
- **13-24°C is the optimum for growth; it is slowed above 30°C**
- **for germination 21-27°C is optimal, but can germinate at very low temperatures too**
- **after the juvenile stage temperatures below 5-10°C for 1-2 months cause vernalization**
- **Water: adequate moisture is critical for uniform seedling emergence; 400-800 mm per crop is required; excess water results skin splitting**

Ecological requirements II

- **Soil: it can be grown on a wide range of soils, from light sands to heavy clay loams; favourable pH is 6.0-7.0**
- **Nutrients: does not need manure**
- **because of its root system, has pure capacity to exploit soil nutrients**
- **need adequate and uniform N supply; frequent small increments are better; late and high N applications should be avoided**
- **require a high level of available P (skin firmness) and K (carbohydrate content) in the soil**
- **sensitive to salinity**

Production method I

- **Tillage: avoidance of soil crusting, seed bed preparation is a key factor, firm seed bed is preferred**
- **Propagation: usually at spring or at autumn**
- **multiple (4-6) rows designs; 25-30 cm row distance**
- **plant density ↔ bulb size**
- **Direct seeding: 2 cm deep, 2-4 kg/ha, usually (250)-400-1.000 thousand plants/ha**
- **Transplanting: 8-12 weeks old transplants, bare rooted or plug transplants (sometimes multi-seeded); 200-400 thousand plants/ha**
- **With sets (small bulbs, < 25 mm in diameter): 1st year - producing the sets with 10-20 million plants/ha density (20 t/ha set yield); sets are stored; 2nd year - planting of the sets**

Production method II

- **Weeding: weekly competitive plant; critical during early seedling growth; herbicides are used; hand and mechanical cultivation is also applied**
- **Irrigation: irrigation cut off (2)-3 weeks before harvest**
- **Fertilization: N should be topdressed at several times**
- **Harvest: 3-6 months after spring sowing; 50%-80% foliage fall-down indicates harvest time**
- **machine harvest is usual**
- **foliage is cut away, bulbs are undercut and lifted from the soil, windrowed**
- **if weather permits bulbs can be cured in the field (max. 1 week); artificial drying is getting more popular nowadays**
- **yields around 50 t/ha are considered good, but even 100 t/ha can be obtained**

Production method III

- **Post-harvest: green onions are bunched; onions for fresh market are mesh bagged**
- **Storage: best conditions are 0°C and 65-70% rh**
- **For green onions 2-3 weeks at 0°C and 95%**
- **Spraying with maleic hydrazide before harvest to inhibit sprouting**