

A top-down photograph of various onion varieties, including yellow, red, and white onions, as well as green onions, arranged on a dark, rich soil background. The onions are scattered around the central text, with some showing their roots and others just the bulbs. The green onions have long, vibrant green stalks.

GROWING & KNOWING ONIONS & EDIBLE RELATIVES

By John Mason and Staff of ACS Distance Education

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CHAPTER 1 SCOPE & NATURE OF THE ONION FAMILY

Onions and their close relatives are popular bulbous vegetables grown around the world. The edible types have a distinctive pungent flavour which can vary from intense to mild. Related plants include edibles, ornamentals, and weeds.

HOW ONIONS ARE CLASSIFIED

Onions belong to the *Allium* genus which is in the Amaryllidaceae family. They were formerly classed in the Liliaceae and Alliaceae families, so older texts may still refer to these families. All the plants in the Amaryllidaceae are herbaceous flowering plants. Most are perennials but others like the onions are bulbous, and there are fewer which are rhizomatous.

Amaryllidaceae are monocotyledonous plants in the order Asparagales. Monocotyledonous plants (monocots) are one of two major groups of plants, the other being the dicotyledonous plants (dicots).

Monocots are plants that share to following visible characteristics:

1. Roots that grow from the base of the stem, with new roots growing each year, rather than a permanent extensive functioning root system.
2. Stems with the vascular tissue (xylem and phloem) in bundles scattered through the stem, rather than in a ring around the outside of the stem.
3. Leaves with veins that are parallel, rather than in a net arrangement with a central vein and then lateral veins.
4. Flowers with the parts arranged in multiples of three, rather than multiples of two or five.
5. Seeds with one seed-leaf that emerges first from the soil after germination of the seed, rather than two seed-leaves.



Onions and garlic

Although there are fewer monocots than dicots, their importance is equal in terms of ecology, economics, and aesthetics.

There are over 500 species within the *Allium* genus including field onions, spring onions, leeks, shallots, garlic and chives. This book will focus on the main star of this genus *Allium cepa*, the common onion, but will also include other commonly cultured species that have gained economic importance over time such as shallots, spring onions, garlic, chives, and leeks.

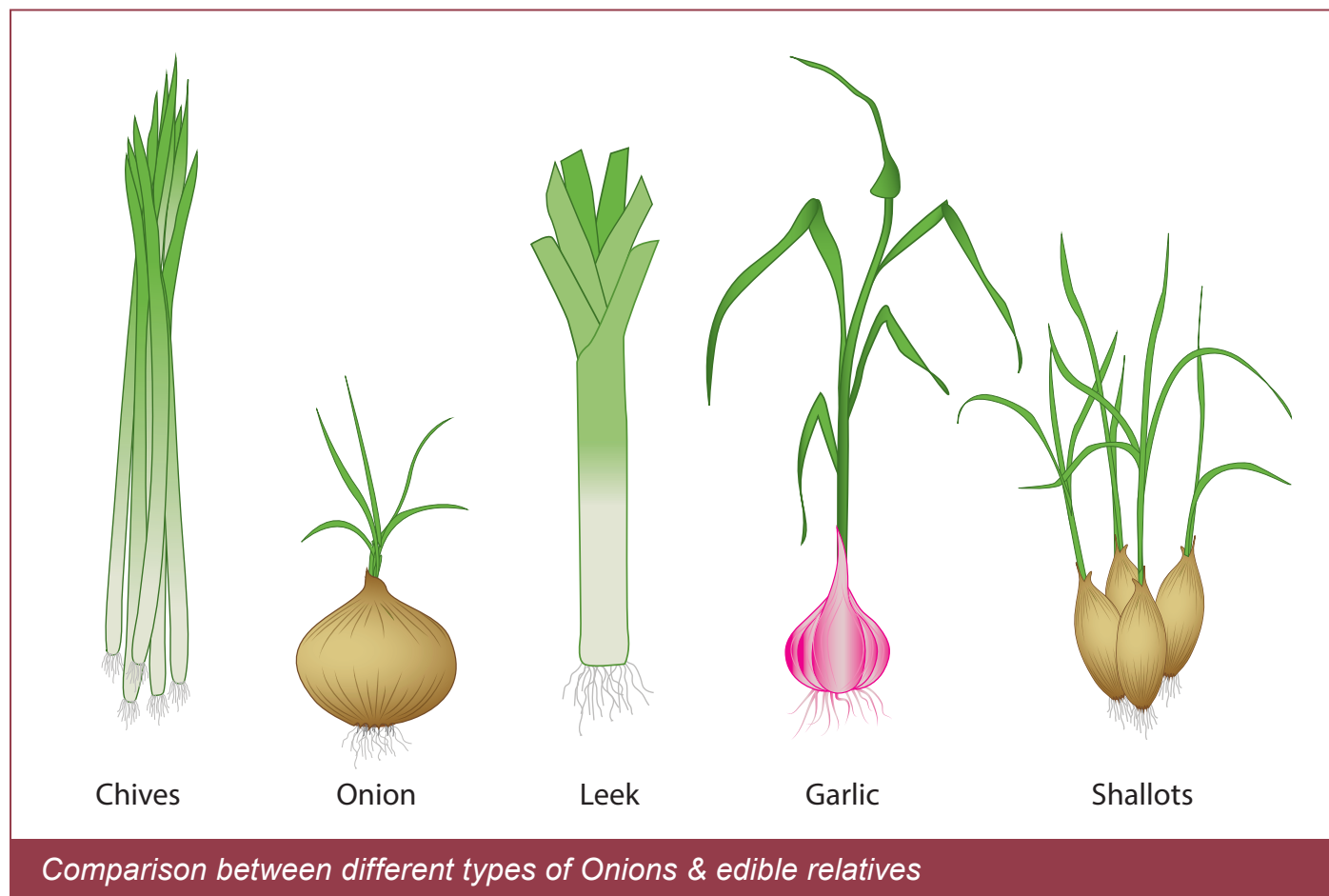
ONION HISTORY

Onions are thought to have originated in central Asia but were also found in, Afghanistan, parts of Russia and China. Since onions grew wild in many regions, determining the origin is difficult. It is suspected that onions may be one of the earliest cultivated crops at least 5000 years ago. They were less perishable than other foods of the

time, they were transportable, were easy to grow, and could be grown in a variety of soils and climates. Onions were not only popular as a food item, but were also used in art, medicine, and mummification (the preservation of a body after death).

Onion is a source of various biologically active compounds, such as phenolic acids, thiosulfinates, and flavonoids. The plant has a variety of pharmacological activities including anti-cancer, anti-diabetic, anti-microbial, cardiovascular and antioxidant effects, justifying its possible use in the treatment of various human ailments.

Today, about 170 countries cultivate onions for either domestic use or trade. China is the leading producer of onions in the world, followed by India, Egypt, and the USA.

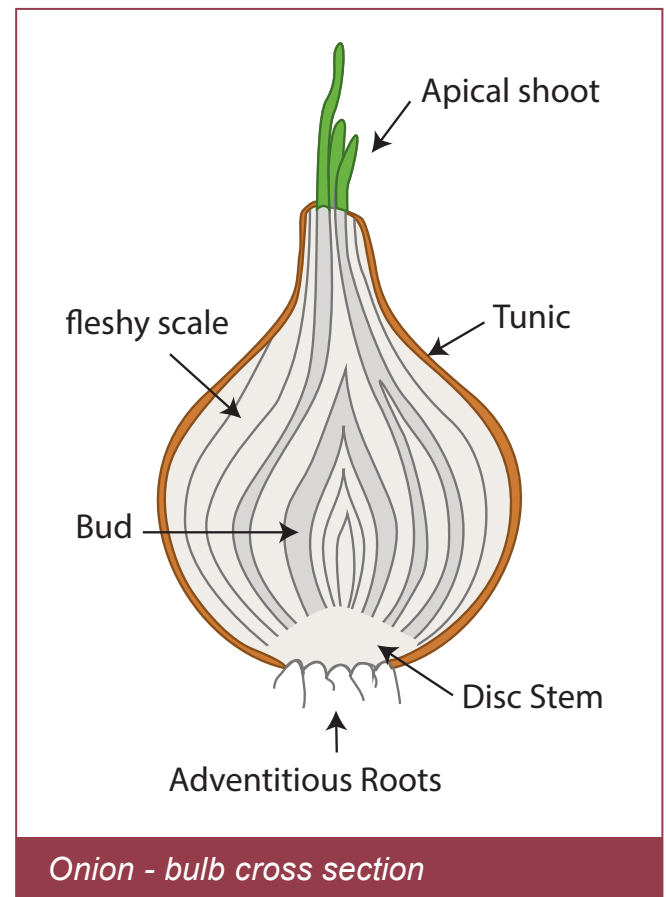


THE CHARACTERISTIC ONIONY FLAVOUR

Onions are odourless until the cells are mechanically damaged.

- When we cut into an onion say, an enzyme called alliinase is released. It catalyses the formation of **allicin** (diallyl thiosulphinate) from allin (S-allyl-L-cysteine sulfoxide), a derivative of the amino-acid cysteine.
- Allicin is a relatively unstable compound. It quickly converts to form a variety of organosulphur compounds (organic sulphur-containing compounds) called thiosulphinates and thiosulphonates.
- These compounds give rise to the characteristic pungent onion odour and flavour. The release of sulphur containing compounds is a natural defence of the plant to deter pests.
- The entire process only takes up to 30 seconds. The more finely the onion is chopped, the more cells are damaged, and the more thiosulphinates and thiosulphonates are formed.

The relative levels of thiosulphinates and thiosulphonates vary among onion varieties. The sulphur content of the soil in which the plant is grown, may also influence the flavour intensity. The higher the sulphur content of the soil, the higher the level of thiosulphinates and thiosulphonates, and the more intense the flavour of the onions.



When onions are cut, sulphenic acid is created upon enzymatic decomposition of alliin. Sulphenic acid and onion enzymes then react to produce *syn-propanethial-S-oxide* (an organosulphur compound).

Syn-propanethial-S-oxide is the gas which causes many people to produce tears when cutting edible onions. When the gas reaches the membranes of the eye, sensory neurons are activated, and a stinging sensation can be felt. The human eye will immediately

