



REVIEW ARTICLE

ORIGIN, TAXONOMY, BOTANICAL DESCRIPTION, GENETICS AND CYTOGENETICS, GENETIC DIVERSITY, BREEDING AND CULTIVATION OF CHIVES

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ABSTRACT

Chives belongs to the family Alliaceae, genus *Allium*, and species *Allium schoenoprasum*. English *chive* derives from Latin *cepa* onion via Middle English *cyve* or *cheve*, a loan from Old French *cive*. Note that the singular *chive* is used for the plant, whereas the spice is usually referred to as plural form *chives*. The botanical species name *schoenoprasum* means essentially rush-like leek: Greek *schoinos* rush (a kind of grass, genus *Juncus*) and *prason* leek. The reference is, obviously, to the leaves' shape. Cf. also the Modern Greek name *praso*. In quite many languages, chives are denoted as a grassy variant of their larger relatives, leek, onion and garlic. Examples from Scandinavia are Swedish *gräslök*, Norwegian *grasløk*, Estonian *murulauk* and Finnish *ruohosipuli* grass-onion; similar are Catalan *all junciforme* rush-shaped garlic, Arabic *waraq basal* onion-leaf and Hebrew *irit basal* asphodel-onion, where *asphodel* refers to a Mediterranean type of lily with hollow leaves (e.g., *Asphodelus fistulosus*) also known as onionweed. Other languages use geographical epithets like Bulgarian *luk sibirski* Siberian onion or Turkish *frenk soğanı* Frankish onion. In the Romance language, the names of chives are often diminutives formed from onion meaning little onion or (if you like that) onionlet: French *civette*, Spanish *cebollana*, Italian *erba cipollina* and Portuguese *cebolinho*. There are two types of chives: 1) Common chives (*Allium schoenoprasum*) with grass like foliage that is round and hollow and globe-shaped mauve flowers. And 2) Garlic or Chinese chives (*Allium tuberosum*) with flatter leaves that have a mild garlic flavour and white, star shaped flowers. Both types grow well in the ground or in pots and can cope with extended periods indoors on a sunny window sill. In the veggie patch or in the garden, chives make a great decorative border plant. Chromosome number $2n = 16, 24, 32$. There were no written records of domesticated chives from the Mediterranean region until the 16th century in Europe, whereas in East Asia chives have been domesticated since ancient times. At present chives are cultivated as vegetables or seasoning herbs all around the world, especially in the Northern Hemisphere. Because chives are very adaptable, tolerant of cold and hot temperatures, and grow rapidly, they can be cultivated and harvested many times throughout the year. They are also easy to propagate, either from seeds or from division of clumps all year round. Chives are grown mainly for their long, cylindrical leaves, used for culinary purposes. Their flowers can also be used for salad dressings and sometimes for decorative purposes. Chive is the smallest species of *Allium* genus and family Alliaceae, which includes other crops such as shallot, onion, garlic, leek and bunching onion. Chive is a nutrients rich food, meaning that while it is low in calorie, it is high in beneficial nutrients like minerals, vitamins and antioxidants too. It is an excellent substitute of salt and a perfect aid for those who are on a low-fat and salt-restricted diet. Chive is mainly used as garnish, and its fresh chopped leaves are stir-fried and used as flavoring in dumplings, soups, stews, pasta, salads. Chive is a monocot, small perennial herb growing in clumps. Plants can be grown from seed or divisions of 2 to 3 bulbs. In this review article on Origin, Taxonomy, Botanical Description, Genetic Diversity, Breeding and Cultivation of Chives are discussed.

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INTRODUCTION

Chives belongs to the family Alliaceae, genus *Allium*, and species *Allium schoenoprasum* (Dhrop, 2018; Chemeurope, 2024; Eddmaps, 2024; Fieldguide, 2024; Forestry, 2024; Invasive, 2024; Google, 2024; Wikipedia, 2024). English *chive* derives from Latin *cepa* onion via Middle English *cyve* or *cheve*, a loan from Old French *cive*. Note that the singular *chive* is used for the plant, whereas the spice is usually referred to as plural form *chives*. The botanical species name *schoenoprasum* means essentially rush-

like leek: Greek *schoinos* rush (a kind of grass, genus *Juncus*) and *prason* leek. The reference is, obviously, to the leaves' shape. Cf. also the Modern Greek name *praso* . In quite many languages, chives are denoted as a grassy variant of their larger relatives, leek, onion and garlic. Examples from Scandinavia are Swedish *gräslök*, Norwegian *grasløk*, Estonian *murulaug* and Finnish *ruohosipuli* grass-onion; similar are Catalan *all junciforme* rush-shaped garlic, Arabic *waraq basal* onion-leaf and Hebrew *irit basal* asphodel-onion, where *asphodel* refers to a Mediterranean type of lily with hollow leaves (e. g., *Asphodelus fistulosus*) also known as onionweed. Other languages use geographical epithets like Bulgarian *luk sibirski* Siberian onion or Turkish *frenk soğanı* Frankish onion. In the Romance language, the names of chives are often diminutives formed from onion meaning little onion or (if you like that) onionlet: French *civette*, Spanish *cebollana*, Italian *erba cipollina* and Portuguese *cebolinho* (Gernot, 2024). In Nepal, a chive relative called *jimbu* (also known as Himalaya onion, *Allium spp.*) is often used for cooking, especially for flavouring potato curries and *dal*, boiled legumes. Usage is restricted to some Himalayan communities, e. g., the Thakali. Rather uniquely, *jimbu* leaves are usually in the dried state and very shortly fried in butter fat or oil to develop their flavor (Gernot, 2024). The name of the species derives from the Greek *skhoínos* (sedge or rush) and *práson* (leek). Its English name, chives, derives from the French word *cive*, from *cepa*, the Latin word for onion. In the Middle Ages, it was known as 'rush leek' (Wikipedia, 2024). The name of the species derives from the Greek *skhoínos* (sedge or rush) and *práson* (leek). Its English name, chives, derives from the French word *cive*, from *cepa*, the Latin word for onion. In the Middle Ages, it was known as 'rush leek' (Inaturalist, 2024).

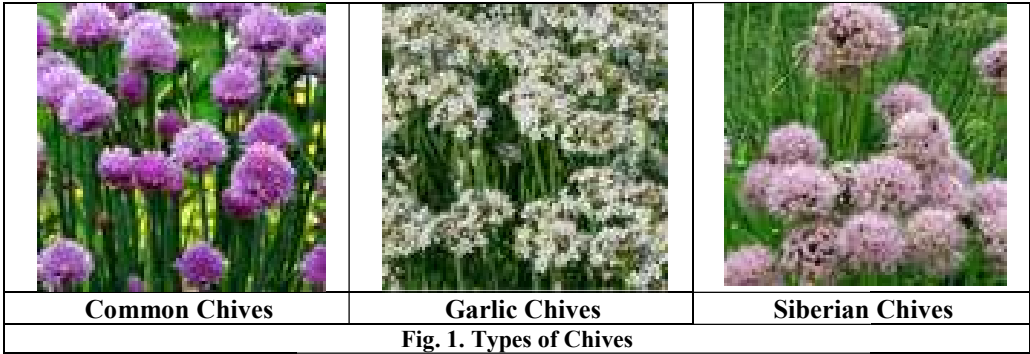
There are four main species of chives grown throughout the world (Fig. 1) (Foodgardening, 2024: Hawaii. 2024):

Common chives (*Allium shoenoprasum*): These are the chives with which we are most familiar. The plants have slender, hollow leaves and clusters of purple flowers. These chives tend to have a slight onion flavor.

Garlic chives (*Allium tuberosum*): Also called Chinese chives, this species has flat green leaves, white flowers, and tastes of garlic. This type of chive is frequently used in Chinese cooking.

Giant Siberian chives (*Allium ledebourianum*): These chives have blue-green leaves, lavender ball-shaped flowers, and an onion flavor. They closely resemble Common chives, but grow much bigger: the leaves can grow to 24 inches and the flowers can stand as high as 3 feet. This species is not native to North America, but is sometimes available by special order.

Siberian garlic chives (*Allium nutans*): Also called Blue chives, this species comes from western and central Siberia, and is taller than Garlic chives. It may have gotten “garlic” in its name because it has similarly flat leaves like Garlic chives, but it doesn’t taste particularly garlicky. Its flowers are rosy violet; they’re often grown for their ornamental value.



The inheritance of nine isozyme systems in selfed progenies of chives was studied electrophoretically (Eickmeyer *et al.*, 1990). The isozyme systems studied were malate-dehydrogenase (MDH), phosphoglucosomerase (PGI), triosephosphate-isomerase (TP1), diaphorase (D1A), menadione-reductase (MDR), esterase (EST), glutamate-oxalacetate-transaminase (GOT), hexokinase (HK) and superoxide-dismutase (SOD) (Eickmeyer *et al.*, 1990). Segregation results of Goodness-of-Fit tests against the expected 1:2:1 and 3:1 ratios for codominant and dominant inheritance, respectively (Eickmeyer *et al.*, 1990). The first results on linkage relationships between isozyme loci and between the *MDr-3-locus* and a male sterility gene are given. These results and further studies will be used to mark important characters in chives (Eickmeyer *et al.*, 1990).

The mitochondria of chive plants with normal N or male-sterile S cytoplasms have been examined by restriction fragment analysis and Southern hybridizations of mitochondrial DNA (mtDNA) and in organello protein biosynthesis (Potz and Tatlioglu, 1993). Restriction fragment patterns of the mtDNA differed extensively between N- and S-cytoplasms. The percentage of fragments with different mobility varied between 44-48% depending on the restriction enzyme used (Potz and Tatlioglu, 1993). In contrast to mtDNA, the restriction fragment patterns of the chloroplast DNA from N- and S-cytoplasms were identical (Potz and Tatlioglu, 1993). The organization of the analyzed mitochondrial genes *coxII*, *coxIII*, *nad1* and *nad3* was different in N- and S-cytoplasms (Potz and Tatlioglu, 1993). Comparison of mitochondrial proteins analyzed by in organello translation revealed an 18-kDa protein present only in S-cytoplasm (Potz and Tatlioglu, 1993). The restorer gene X suppressed the synthesis of that protein in S-cytoplasm. Thus, the 18-kDa protein seems to be associated with the cytoplasmic male-sterile phenotype (Potz and Tatlioglu, 1993).

Allium schoenoprasum is a member of the section *schoenoprasum* of the genus *Allium* (Kalloo, 1993). The natural habitats of *Allium schoenoprasum* are Asia, Europe, and Northern America, including the Arctic (Kalloo, 1993). In Europe, it has been used as a spice ever since the early Middle Ages at the latest. The leaves of chives are used as appetizing condiment in soups, cooked meals, salads, and also as sandwich filling (Kalloo, 1993). In Siberia, salted chives are stored for winter use. *Allium schoenoprasum* belongs to the permanent cultures and grows on practically all soils, which are not too poor or dry (Kalloo, 1993). The spicy flavor of chives is caused by the content of garlic oil. It contains relatively high amounts of vitamin C, carotin, and calcium (Kalloo, 1993). The minor role of *Allium schoenoprasum* on a world scale and the known diversity of this crop reduce the necessity for large collections (Kalloo, 1993).

Allium schoenoprasum is a member of the section *schoenoprasum* of the genus *Allium* (Tatlioglu, 1993). The natural habitats of *Allium schoenoprasum* are Asia, Europe, and Northern America, including the Arctic (Tatlioglu, 1993). In Europe, it has been used as a spice ever since the early Middle Ages at the latest. The leaves of chives are used as appetizing condiment in soups, cooked meals, salads, and also as sandwich filling (Tatlioglu, 1993). In Siberia, salted chives are stored for winter use (Tatlioglu, 1993). *Allium schoenoprasum* belongs to the permanent cultures and grows on practically all soils, which are not too poor or dry (Tatlioglu, 1993). The spicy flavor of chives is caused by the content of garlic oil. It contains relatively high amounts of vitamin C, carotin, and calcium (Tatlioglu, 1993). Breeding objectives in chives are forcing ability, homogeneous growth, tillering ability, desired leaf diameter, late flower formation in forcing, upright leaf position, and yield (Tatlioglu, 1993). The minor role of *Allium schoenoprasum* on a world scale and the known diversity of this crop reduce the necessity for large collections (Tatlioglu, 1993).

There were no written records of domesticated chives from the Mediterranean region until the 16th century in Europe, whereas in East Asia, chives have been domesticated since ancient times (Chen, 2012). Currently, chives are cultivated as vegetables or seasoning herbs all around the world, especially in the Northern Hemisphere (Chen, 2012). Because chives are very adaptable, tolerant of cold and hot temperatures and grow rapidly, they can be cultivated and harvested many times throughout the year (Chen, 2012). They are also easy to propagate, either from seeds or from division of clumps all year round (Chen, 2012). Chives are grown mainly for their long, cylindrical leaves, used for culinary purposes. Their flowers can also be used for salad dressings and sometimes for decorative purposes (Chen, 2012). Unlike the pungent flavor of garlic and onions, the flavor of chives is milder and more delicate, and more easily acceptable to the palate (Chen, 2012). Chives also contain many vitamins and mineral nutrients as well as flavonoid compounds, which are antioxidants (Chen, 2012). Among all *Allium* species, chives have the highest content of vitamin C and beta-carotene (Chen, 2012). Chives have green leaves that are soft in texture and are easily kept fresh and transported using drying and freezing techniques (Chen, 2012).

The plant known as chives is a perennial of the *Liliaceae* family, *Allium* species. Chromosome number $2n = 16, 24, 32$ (Chen, 2012a). There were no written records of domesticated chives from the Mediterranean region until the 16th century in Europe, whereas in East Asia chives have been domesticated since ancient times (Chen, 2012a). At present chives are cultivated as vegetables or seasoning herbs all around the world, especially in the Northern Hemisphere (Chen, 2012a). Because chives are very adaptable, tolerant of cold and hot temperatures, and grow rapidly, they can be cultivated and harvested many times throughout the year (Chen, 2012a). They are also easy to propagate, either from seeds or from division of clumps all year round (Chen, 2012a). Chives are grown mainly for their long, cylindrical leaves, used for culinary purposes. Their flowers can also be used for salad dressings and sometimes for decorative purposes (Chen, 2012a). Chives also contain many vitamins and mineral nutrients (Rubatzky and Yamaguchi, 1997) as well as flavonoid compounds, which are antioxidants (Chen, 2012a). Among all *Allium* species, chives have the highest content of vitamin C and beta-carotene (Chen, 2012a). Chives have green leaves that are soft in texture and are easily kept fresh and transported using drying and freezing techniques (Chen, 2012a).

Chive is the only species of *Allium* group, which is native to both the Old and New World (Rana and Brar, 2017). In India, both European and Chinese chives are minor vegetable and grown on large areas (Rana and Brar, 2017). Chive is the smallest species of *Allium* genus and family *Alliaceae*, which includes other crops such as shallot, onion, garlic, leek and bunching onion (Rana and Brar, 2017). Chive is a nutrients rich food, meaning that while it is low in calorie, it is high in beneficial nutrients like minerals, vitamins and antioxidants too (Rana and Brar, 2017). It is an excellent substitute of salt and a perfect aid for those who are on a low-fat and salt-restricted diet (Rana and Brar, 2017). Chive is mainly used as garnish, and its fresh chopped leaves are stir-fried and used as flavoring in dumplings, soups, stews, pasta, salads (Rana and Brar, 2017). Chive is a monocot, small perennial herb growing in clumps. Plants can be grown from seed or divisions of 2 to 3 bulbs (Rana and Brar, 2017).

Chives are slim green garlic-like fragrant garden herbs, used to flavour foods, and are normally consumed fresh (RSC, 2021). Useful as insect repellent in gardens, the flowers are edible, providing decoration and flavour to dishes (RSC, 2021). Chives have had limited use in traditional medicine. Chives possess a number of bioactive properties (RSC, 2021). Research from Asia, Europe, the US and South America has identified chives as possessing antioxidant, anti-inflammatory, anti-hypertensive, anti-platelet and anti-microbial properties (RSC, 2021). Chives with rare flower colours have always been hard to find, but for the first time, three colours and a mixture can now be grown from seed (Rice, 2023). Most of us grow chives (*Allium schoenoprasum*); the invaluable snip-and-taste culinary herb that has so many uses in the kitchen and is so easy to grow in the garden (Rice, 2023). But as well as that versatile flavour, chives bring us pale purple, honey-scented, pollinator-friendly pompom flowers, which, like the leaves, are also edible. However, most of us tend to grow the same type of chives – the wild-type species, *Allium schoenoprasum* – rather than venturing into cultivars (Rice, 2023). Plants in white and a range of pink shades have been available previously, but they've been hard to find in nurseries, and stocks have usually been limited (Rice, 2023). Now, we can grow a range of shades from seed, bringing a new splash of bee-friendly colour to our herb gardens, potagers and containers (Rice, 2023). Perennials are

plants that live for multiple years. They come in all shapes and sizes and fill our gardens with colourful flowers and ornamental foliage (Rice, 2023). Many are hardy and can survive outdoors all year round, while less hardy types need protection over winter (Rice, 2023). The term herbaceous perennial is used to describe long-lived plants without a permanent woody structure (they die back to ground level each autumn), distinguishing them from trees, shrubs and sub-shrubs (Rice, 2023). Perennial Seeds, founded in 1957 and known the world over for their many years developing high-quality, seed-raised perennial flowers and herbs (Rice, 2023). The seeds will peep through after two or three weeks, at which point the temperature can be lowered, and the plants grown on for planting in summer (Rice, 2023). Chives are a perennial herb which resembles hollow blades of grass, and is the smallest member of the onion family (Ellingsworth, 2024). The chive plant, scientifically known as *Allium schoenoprasum*, is a member of the onion family and is related to garlic. It is the oldest species of edible onion known (Ellingsworth, 2024). The botanical name actually comes from the Greek meaning, "reed-like leek" (Ellingsworth, 2024). This herb is native to Britain, Northern Europe and North America. They are the easiest to grow of the fresh herbs used for culinary purposes (Ellingsworth, 2024). Chives have a mild onion taste (Ellingsworth, 2024). Did you know: The entire chive plant is edible? The leaves, blossoms, and even bulbs, all find uses in the kitchen (Ellingsworth, 2024). The first recorded use of chives occurred in China in about 3000 B.C. Some say that Marco Polo may have brought the idea to use chives back with him from the East. However, there is no real evidence for their common use until about the 1500s when they found their way into dishes and herb gardens (Ellingsworth, 2024). Chives are native to both Europe and Asia. It grows wild all across both regions, but there are slight variations in different locations. A variety found in the Alps is the one nearest to what is generally cultivated today (Ellingsworth, 2024). Chives are usually referred only in the plural, because they grow in clumps rather than alone (Ellingsworth, 2024). Medieval gardeners often planted chives around the borders for both decoration and to ward off harmful insects. It was thought that hanging bunches of chives around a house could also ward off evil (Ellingsworth, 2024). Medicinally, **chives** have been used for thousands of years in traditional Chinese medicine to promote sweating and male fertility (Ellingsworth, 2024). Romanian Gypsies use chives for fortunetelling (Ellingsworth, 2024). The genus *Allium* is the most diverse, with cultivated crops such as onion, garlic, bunching onion, chives, leeks, and shallots, and several wild and semi-domesticated *Allium* species utilized as minor vegetables (Gowd *et al.*, 2024). These minor species are the genetic resources for various abiotic and biotic stresses (Gowd *et al.*, 2024). To employ underutilized species in breeding programmes, the magnitude of the genetic background of cultivated and semi-domesticated alliums, the phylogeny and diversity of the population must be known (Gowd *et al.*, 2024). Chives are among the most popular herbs for home gardeners to grow (Walliser, 2024). They are easy to plant and care for, and since they are a hardy perennial, they return to the garden year after year (Walliser, 2024). The fragrant and flavorful leaves of the chive plant are delicious to people, but the deer and rabbits leave them alone (Walliser, 2024). To add yet another benefit, chive flowers are a favorite nectar source for many of the pollinators who also help pollinate other edible crops (Walliser, 2024). Learning how to harvest chives for use in the kitchen is key to enjoying this easy-to-grow herb (Walliser, 2024). Harvesting at the wrong time will not result in plant death. It could however limit future growth and reduce the amount of leaves you're able to harvest (Walliser, 2024). With their fresh green color and their mildly pungent, crisp onion taste, chives are one of the best additions to almost any savory meal (Foodprint, 2024). And while we most frequently use them as a garnish in the U.S., different varieties of chives can also be enjoyed as cooked greens (Foodprint, 2024). In the garden, chives are simpler to grow than many other related alliums, like garlic or onions, and they're also easy to preserve for year-round enjoyment (Foodprint, 2024). The word chive comes from the French word cive and cepa, the Latin word for onion. The Cantonese word for Chinese chives is gao choy (Foodprint, 2024). In the early 1900s, chive was a slang word that meant "a shout." In "A Treatise on Gardening by a Citizen of Virginia," colonial American botanist John Randolph compared chives to other alliums and noted that they "do not affect the breath so much as the other sorts." (Foodprint, 2024). The European chive is considered both the smallest and most delicate member of the extensive *Allium* family (Foodprint, 2024). It still grows wild in mountainous regions in temperate climates worldwide, but it's widely agreed among botanists that the cultivated version closely resembles its wild ancestors (Foodprint, 2024). Unlike other herbs, chives are not a commodity crop when sold fresh. Commercially grown chives are primarily destined for food products (like sour cream and chive-flavored potato chips) or freeze-dried for the spice aisle (Foodprint, 2024). In retail stores, fresh chives are typically chopped and packaged in plastic containers and rarely sold in bunches. Outside the U.S., food distributors import fresh chives from Mexico (Foodprint, 2024). Both European and Chinese chives are hardy and keep for several days in the refrigerator if wrapped loosely in a paper or cloth towel. They do not like moisture, so wait to clean until just before using (Foodprint, 2024).

Chives are usually referred only in the plural, because they grow in clumps rather than alone (Ellingsworth, 2024). Medieval gardeners often planted chives around the borders for both decoration and to ward off harmful insects (Ellingsworth, 2024). It was thought that hanging bunches of chives around a house could also ward off evil (Ellingsworth, 2024). Medicinally, chives have been used for thousands of years in traditional Chinese medicine to promote sweating and male fertility (Ellingsworth, 2024). Romanian Gypsies use chives for fortunetelling (Ellingsworth, 2024). Chives are a perennial herb which resembles hollow blades of grass, and is the smallest member of the onion family. The chive plant, scientifically known as *Allium schoenoprasum*, is a member of the onion family and is related to garlic. It is the oldest species of edible onion known. The botanical name actually comes from the Greek meaning, "reed-like leek" (Ellingsworth, 2024). This herb is native to Britain, Northern Europe and North America (Ellingsworth, 2024). They are the easiest to grow of the fresh herbs used for culinary purposes. Chives have a mild onion taste. Did you know: The entire chive plant is edible? The leaves, blossoms, and even bulbs, all find uses in the kitchen (Ellingsworth, 2024). The first recorded use of chives occurred in China in about 3000 B.C. (Ellingsworth, 2024). Some say that Marco Polo may have brought the idea to use chives back with him from the East (Ellingsworth, 2024). There is no real evidence for their common use until about the 1500s when they found their way into dishes and herb gardens (Ellingsworth, 2024).

Chive, generally used in the plural as chives, is the common name for a bulbous, fragrant, herbaceous plant, *Allium schoenoprasum*, which is characterized by slender, hollow leaves and clusters of lavender flowers (Plantgrower, 2024). The term chives also refers more specifically to the edible leaves of this plant, which are used as a popular seasoning. Because the plants

grows in clumps, rather than as individual plants, typically the term "chives" is used rather than "chive," although various references also use chive as the main entry (Plantgrower, 2024). Chives are used as common culinary herbs to provide a mild onion flavor, with the leaves used fresh or dried (Plantgrower, 2024). The colorful and edible flowers also may be added for salads. In addition, chives are cultivated for their ornamental value, such as used in dry bouquets or in flower gardens, and traditionally have been used for medicinal value (Plantgrower, 2024). The unique appearance, taste, smell, and texture of chives offer a unique joy to humans, beyond the mere nutritional or other utilitarian value of the herb (Plantgrower, 2024).

Chives, *Allium schoenoprasum*, is a species in the lily family (Liliaceae) that is native to Europe and Asia (and possibly North America, but there is some dissention on whether it is truly native or naturalized there) (Mahr, 2024). It has been cultivated in Europe since the Middle Ages, both for culinary and medicinal purposes, and as long as 4,000 years ago by the Chinese (Mahr, 2024). Today the leaves are typically used as a culinary herb with a mild onion flavor (Mahr, 2024). This plant, a perennial with brighter green, flatter and more angular leaves and white flowers in the fall (Mahr, 2024). That plant has larger bulbs and a more pronounced garlic flavor. It can be used just like regular chives (Mahr, 2024). This species is an herbaceous perennial. The plant grows in dense clumps of slender bulbs, each bulb producing hollow tubular leaves 8-20 inches long (Mahr, 2024). The soft-textured, blue-green leaves emerge in spring before the plant blooms and will continue to produce new leaves throughout the growing season so the plant remains fresh-looking (Mahr, 2024). In mild climates the plants may remain evergreen but in cold climates the foliage is killed over the winter. Old plant remains should be removed in late winter before growth resumes in early spring (Mahr, 2024). Chives bloom in mid spring to early summer. Each inflorescence is surrounded by a papery bract that splits open at flowering (Mahr, 2024). The pink to pale purple round globes are composed of many small, tightly packed, star-shaped florets (Mahr, 2024). The inflorescence typically has 10-30 individual flowers each with six tepals. The flowers are attractive to pollinators and are frequently visited by bumblebees and other types of bees (Mahr, 2024). Pollinated flowers produce small angular black seeds that are enclosed in a small, three-valved capsule (Mahr, 2024). Chives are one of the easiest herbs to grow. They do best when planted in full sun in rich, well-drained soil, although they will tolerate light shade (flowering may be reduced) and most soil types (Mahr, 2024). They are easy to grow from seed or from divisions. Seeds can be started indoors a few weeks before the average date of last frost to be planted outside after the danger of frost is past, or can be direct seeded once the soil is warm (Mahr, 2024). Space the clumps 12-20 inches apart. Since they are fairly shallow-rooted be careful when cultivating around the plants – or mulch for weed control. Chives are drought tolerant once established, although they will grow best when given consistent moisture (Mahr, 2024). They have low nutrient requirements, so do not need regular fertilization (Mahr, 2024). Plants should be divided every 2-3 years to prevent overcrowding. Divisions should include at least 5 bulblets (Mahr, 2024). Chives have no significant insect or disease problems and are not favored by deer or rabbits. The grass-like foliage provides good contrast in texture and form to mounding perennials with coarser foliage, while the attractive flowers offer nice color when in bloom (Mahr, 2024). Chives can be harvested any time during the growing season after the leaves are about 6" long, although the older leaves will be tougher than the new ones (Mahr, 2024). The flavor will be more pungent in hotter weather. Plants can be cut back to about 3" high after flowering to force the plant to produce new, tender leaves (Mahr, 2024). When harvesting, cut as you need chives, selecting just some of the leaves in a clump each time for continuous harvest through the season (Mahr, 2024). If the entire clump is cut back it will take several weeks for the leaves to regrow (Mahr, 2024). Use only turgid, green leaves (without yellow tips or any browning or wilting). Snip with scissors or use a knife to cut the leaves about 2" from the base (Mahr, 2024). They can be used immediately or stored under refrigeration for up to a week. Chives can also be frozen or dried for later use, but the leaves lose a lot of their flavor when dried (Mahr, 2024). The leaves are often chopped into small segments to be used as seasoning or garnish sprinkled on the food just before serving. The flowers are edible as well (Mahr, 2024).

Chives are the smallest species of the onion family Alliaceae, native to Europe, Asia and North America (Chemeurope, 2024). They are referred to only in the plural, because they grow in clumps rather than as individual plants (Chemeurope, 2024). *Allium schoenoprasum* is also the only species of *Allium* native to both the New and the Old World (Chemeurope, 2024). Its species name derives from the Greek *skhoinos* (sedge) and *prason* (onion). Its English name, *chive*, derives from the French word *cive*, which was derived from *cepa*, the Latin word for onion (Chemeurope, 2024). Culinary uses for chives involve shredding its leaves (straws) for use as condiment for fish, potatoes and soups. Because of this, it is a common household herb, frequent in gardens as well as in grocery stores (Chemeurope, 2024). It also has insect-repelling properties which can be used in gardens to control pests (Chemeurope, 2024). Albeit repulsive to insects in general, due to its sulfur compounds, its flowers are attractive to bees, and it is sometimes kept to increase desired insect life (Chemeurope, 2024). Chives have been cultivated in Europe since the Middle Ages, although signs of its usage date back to 5000 years ago, used by the Chinese (Chemeurope, 2024). The Romans believed chives could relieve the pain from sunburn or a sore throat. They believed that eating chives would increase blood pressure and acted as a diuretic. Romanian Gypsies have used chives in fortune telling (Chemeurope, 2024). It was believed that bunches of dried chives hung around a house would ward off disease and evil (Chemeurope, 2024).

Chives are in the onion family. They form clumps of tiny (RHS, 2024). These are fleshy, rounded, underground storage organs, usually sold and planted while dormant. Examples include daffodils, tulips, hyacinths, lilies, onions and garlic. The term is often used to cover other underground storage organs, including corms, tubers and rhizomes (RHS, 2024). Bulbs that sprout narrow, cylindrical leaves up to 30cm tall. These leaves can be harvested from spring to autumn, dying down over winter and re-sprouting every spring (RHS, 2024). A popular and easy-to-use herb, chives are simple to grow and need very little maintenance. Buy young plants or raise them from seed and give them a sunny or lightly shaded spot, in the ground or in containers. Then just harvest regularly to keep fresh leaves coming. You can also make new plants every few years by dividing established clumps in spring. Chives are also highly decorative, producing mauve pompom flowers in late spring and summer (RHS, 2024). The mild onion-flavoured leaves are used raw, finely chopped and scattered over salads, soups, fish dishes, eggs, baked potatoes and more (RHS,

2024). The flowers are edible too and can be used in a similar way to the leaves. The nectar-rich flowers also attract bees and other pollinating insects, so leave plenty for them to enjoy too (RHS, 2024).

Chives are a versatile herb that belong to the onion and garlic family. This easy to grow herb adds a subtle onion flavour to salads, soups and savoury dishes and is also a popular ingredient in Asian cooking. Even the pretty summer flowers are edible and can be used as a snazzy garnish at your next dinner party (Ecoorganic, 2024). There are two types of chives: 1) Common chives (*Allium schoenoprasum*) with grass like foliage that is round and hollow and globe-shaped mauve flowers. And 2) Garlic or Chinese chives (*Allium tuberosum*) with flatter leaves that have a mild garlic flavour and white, star shaped flowers (Ecoorganic, 2024). Both types grow well in the ground or in pots and can cope with extended periods indoors on a sunny window sill. In the veggie patch or in the garden, chives make a great decorative border plant (Ecoorganic, 2024). Chives is the common name of *Allium schoenoprasum*, the smallest species of the edible onions (Google, 2024c). A perennial plant, it is native to Europe, Asia and North America (Google, 2024c). *A. schoenoprasum* is the only species of *Allium* native to both the New and the Old Worlds (Google, 2024c). The name of the species derives from the Greek skhoínos and práson (Google, 2024c). Its English name, chives, derives from the French word cive, from cepa, the Latin word for onion (Google, 2024c). Chives are a commonly used herb and can be found in grocery stores or grown in home gardens (Google, 2024c). In culinary use, the scapes are diced and used as an ingredient for fish, potatoes, soups, and other dishes (Google, 2024c). Chives have insect-repelling properties that can be used in gardens to control pests (Google, 2024c).

Chives (*Allium schoenoprasum*) are perennial herbs belonging to the onion family, including onions, garlic, and leeks (Azure Farm. 2025). Native to Europe, Asia, and North America, chives are widely cultivated for their flavorful and aromatic leaves with a delicate oniony flavor and a hint of garlic (Azure Farm. 2025). Delicious Flavor: Both chive stalks and the flowers are edible, which add yummy flavor and make excellent garnishes for your meals (Azure Farm. 2025). Nutritional Punch: Rich in essential vitamins like A and C, chives also contain minerals such as calcium and iron, making them a valuable addition to any diet (Azure Farm. 2025). Easy To Grow: Aside from their nutritional benefits, chives are incredibly easy to grow, even for beginners (Azure Farm. 2025). Needs Little Space: Whether you have a sprawling garden or limited space for pots on your windowsill, chives can thrive and provide a fresh, aromatic touch to your dishes year-round (Azure Farm. 2025). Attract Pollinators: Chives attract pollinators because their blossoms bloom from mid-spring to early summer, just when summer crops begin to flourish. The scent and color of chives entice bees, butterflies, wasps, hornets, and other pollinators to your garden (Azure Farm. 2025). Chives Repel Pests and are Good Companion Plants: Because chives are linked to onions, their pungent aroma is a natural pest deterrent. The strong odor repels carrot flies, aphids, beetles, and cabbage worms. They also aid in the growth of other plants around them (more on this down below!) (Azure Farm. 2025). In this review article on Origin, Taxonomy, Botanical Description, Genetic Diversity, Breeding and Cultivation of Chives are discussed.

Chives (*Allium schoenoprasum*) originated in the north temperate zone. Chives are the only one of the allium species native to both the Old World and the New. Indeed, the plant's wild form occurs in Asia as well as in North America and Europe (Peterson, 2000). Chives (*Allium schoenoprasum*) are the smallest species of the edible onions. They are native to Europe, Asia and North America. *Allium schoenoprasum* is also the only species of *Allium* native to both the New and the Old World and is a perennial (Anonymous, 2013). Chives are the only species of *Allium* native to both the New and the Old Worlds. Sometimes, the plants found in North America are classified as *A. schoenoprasum* var. *sibiricum* (Wikipedia, 2024). Chives are native to both Europe and Asia. It grows wild all across both regions, but there are slight variations in different locations. A variety found in the Alps is the one nearest to what is generally cultivated today (Ellingsworth, 2024). Chives are the only species of *Allium* native to both the New and the Old Worlds. Sometimes, the plants found in North America are classified as *A. schoenoprasum* var. *sibiricum*, although this is disputed. Differences between specimens are significant. One example was found in northern Maine growing solitary, instead of in clumps, also exhibiting dingy grey flowers (Inaturalist, 2024). Chives are the only species of *Allium* native to both the Old World and New. Sometimes, the plants found in North America are classified as *A. schoenoprasum* var. *sibiricum*, although this is disputed. There have been significant differences among specimens: one example was found in northern Maine growing solitary, instead of in clumps, also exhibiting dingy grey flowers (Chemeurope, 2024). Chives, specifically *Allium schoenoprasum*, have a diploid chromosome number of $2n = 16$. They are a good subject for studying meiosis due to their easily dissected anthers and relatively large, easily stainable chromosomes. Cytogenetics involves the study of chromosomes and their behavior during cell division, and chives are often used in biology labs to observe these processes. Chives generally have a diploid chromosome number of $2n = 16$ (8 pairs).

In the Mediterranean, it is native in European countries but absent from the countries of N. Africa and the Levantine coast (Stefanaki and Andel, 2021). Chives are native to temperate areas of Europe, Asia and North America (Wikipedia, 2024). Chives have a wide natural range across much of the Northern Hemisphere. In Asia it is native from the Ural Mountains in Russia to Kamchatka in the far east. It grows natively in the Korean peninsula, but only the islands of Hokkaido and Honshu in Japan. Likewise its natural range in China only extends to Xinjiang and Inner Mongolia, though it is also found in adjacent Mongolia. It is native to all the nations of the Caucasus. However, in Central Asia it is only found in Kazakhstan and Kyrgyzstan. To the south its range also extends to Afghanistan, Iran, Iraq, Pakistan, and the Western Himalayas in India. It is native to all parts of Europe with the exception of Sicily, Sardinia, the island of Cyprus, Iceland, Crimea, and Hungary and other offshore islands. It also is not native to Belgium and Ireland, but it grows there as an introduced plant. In North America it is native to Alaska and almost every province of Canada, but has been introduced to the island of Newfoundland. In the United States the certain native range in the lower 48 is in two separated areas. In the west its range is in Washington, Oregon, Idaho, Montana, Wyoming, and Colorado. In the east it extends from Minnesota, eastward through Wisconsin, Michigan, Ohio, Pennsylvania, and New Jersey. Then northward into New York and all of New England. The Plants of the World Online database lists it as introduced to Illinois and Maryland and

the USDA Natural Resources Conservation Service PLANTS database additionally lists it as growing in Nevada, Utah, Missouri, and Virginia without information on if it is native or introduced to those states. In other areas of the Americas chives grow as an introduced plant in Mexico, Honduras, Costa Rica, Cuba, Jamaica, Hispaniola, Trinidad, Colombia, Bolivia, and the southern part of Argentina in Tierra del Fuego (Wikipedia, 2024). Chives are native to temperate areas of Europe, Asia and North America (Inaturalist, 2024). Chives have a wide natural range across much of the Northern Hemisphere. In Asia it is native from the Ural Mountains in Russia to Kamchatka in the far east. It grows natively in the Korean peninsula, but only the islands of Hokkaido and Honshu in Japan. Likewise its natural range in China only extends to Xinjiang and Inner Mongolia, though it is also found in adjacent Mongolia. It is native to all the nations of the Caucasus. However, in Central Asia it is only found in Kazakhstan and Kyrgyzstan. To the south its range also extends to Afghanistan, Iran, Iraq, Pakistan, and the Western Himalayas in India. It is native to all parts of Europe with the exception of Sicily, Sardinia, the island of Cyprus, Iceland, Crimea, and Hungary and other offshore islands. It also is not native to Belgium and Ireland, but it grows there as an introduced plant (Inaturalist, 2024). Chives are native to: Afghanistan, Alaska, Albania, Alberta, Altay, Austria, Baltic States, Belarus, British Columbia, Bulgaria, Buryatiya, Central European Russia, Chita, Colorado, Connecticut, Corse, Czechoslovakia, Denmark, East European Russia, Finland, France, Germany, Great Britain, Greece, Idaho, Inner Mongolia, Iran, Iraq, Irkutsk, Italy, Japan, Kamchatka, Kazakhstan, Khabarovsk, Korea, Krasnoyarsk, Kuril Is., Labrador, Magadan, Maine, Manitoba, Massachusetts, Michigan, Minnesota, Mongolia, Montana, Netherlands, New Brunswick, New Hampshire, New Jersey, New York, North Caucasus, North European Russia, Northwest European Russia, Northwest Territories, Norway, Nova Scotia, Nunavut, Ohio, Ontario, Oregon, Pakistan, Pennsylvania, Poland, Portugal, Primorye, Prince Edward I., Québec, Rhode I., Romania, Sakhalin, Saskatchewan, South European Russia, Spain, Sweden, Switzerland, Tadzhikistan, Transcaucasus, Turkey, Tuva, Ukraine, Vermont, Washington, West Himalaya, West Siberia, Wisconsin, Wyoming, Xinjiang, Yakutskiya, Yugoslavia, Yukon (Google, 2024). Chives are introduced into: Argentina South, Azores, Belgium, Comoros, Cuba, Dominican Republic, Falkland Is., Haiti, Illinois, Ireland, Jamaica, Maryland, Newfoundland, Seychelles, Trinidad-Tobago (Google, 2024).

TAXONOMY

It was formally described by the Swedish botanist Carl Linnaeus in his seminal publication *Species Plantarum* in 1753. Several subspecies have been proposed, but are not accepted by Plants of the World Online, as of July 2021, which sinks them into two subspecies: *Allium schoenoprasum* subsp. *gredense* (Rivas Goday) Rivas Mart., Fern.Gonz. & Sánchez Mata. And *Allium schoenoprasum* subsp. *latiorifolium* (Pau) Rivas Mart., Fern.Gonz. & Sánchez Mata. Varieties have also been proposed, including *A. schoenoprasum* var. *sibiricum*. The Flora of North America notes that the species is very variable, and considers recognition of varieties as "unsound" (Inaturalist, 2024; Wikipedia, 2024). Chives belongs the family: Amaryllidaceae (Amaryllis family), subfamily: Allioideae (Onion subfamily), tribe: Allieae, genus: *Allium* (Onions), subgenus: *Cepa*, section: *Schoenoprasum* and **species:** *Allium schoenoprasum* (Chives) (Gowd *et al.*, 2024).

Synonyms

Homotypic Synonyms (Google, 2024).

1. *Allium schoenoprasum* subsp. *euschoenoprasum* Syme in J.E.Smith, Engl. Bot., ed. 3, 9: 315 (1869), not validly publ.
2. *Ascalonicum schoenoprasum* (L.) P.Renault in Fl. Orne: 33 (1804)
3. *Cepa schoenoprasa* (L.) Moench in Methodus: 244 (1794)
4. *Porrum schoenoprasum* (L.) Schur in Enum. Pl. Transsilv.: 670 (1866)
5. *Schoenissa schoenoprasa* (L.) Salisb. in Gen. Pl.: 91 (1866), not validly publ.
6. *Schoenoprasum vulgare* Fourr. in Ann. Soc. Linn. Lyon, n.s., 17: 159 (1869)

Heterotypic Synonyms (Google, 2024).

1. *Allium acutum* Spreng. in Pl. Min. Cogn. Pug. 1: 28 (1813)
2. *Allium alpinum* (DC.) Hegetschw. in Fl. Schweiz: 322 (1839)
3. *Allium broteri* Kunth in Enum. Pl. 4: 454 (1843)
4. *Allium buhseanum* Regel in Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 81 (1875)
5. *Allium carneum* Schult. & Schult.f. in J.J.Roemer & J.A.Schultes, Syst. Veg., ed. 15[bis]. 7: 1028 (1830), nom. illeg.
6. *Allium coloratum* Dulac in Fl. Hautes-Pyrénées: 110 (1867), nom. illeg.
7. *Allium foliosum* Clarion ex DC. in J.B.A.M.de Lamarck & A.P.de Candolle, Fl. Franç., éd. 3, 3: 725 (1805)
8. *Allium glaucum* Ledeb. in Fl. Ross. 4: 167 (1852), nom. illeg.
9. *Allium gredense* Riv.Mateos in Bol. Real Soc. Esp. Hist. Nat. 24: 386 (1924)
10. *Allium idzuense* H.Hara in J. Jap. Bot. 49: 1 (1974)
11. *Allium lusitanicum* Link ex Regel in Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 78 (1875), not validly publ.
12. *Allium montanum* Schrank in F.P.von Schrank & K.M.E.von Moll, Naturhist. Briefe Oestreich 2: 202 (1785)
13. *Allium palustre* Chaix in D.Villars, Hist. Pl. Dauphiné 1: 321 (1786)
14. *Allium palustre* Pourr. ex Lag. in Elench. Pl.: 13 (1816), nom. illeg.
15. *Allium palustre* Salisb. in Prodr. Stirp. Chap. Allerton: 235 (1796), nom. illeg.
16. *Allium punctulatum* Schltld. in Linnaea 19: 401 (1846)
17. *Allium purpurascens* Losa in Contr. Estud. Fl. Veg. Zamora: 142 (1949)
18. *Allium raddeanum* Regel in Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 155 (1875)

19. *Allium reflexum* F.Dietr. in Vollst. Lex. Gärtn., ed. 2, 1: 285 (1824)
20. *Allium riparium* Opiz in Naturalientausch 6: 50 (1824)
21. *Allium roseum* Krock. in Fl. Siles. 1: 516 (1787), nom. illeg.
22. *Allium schmitzii* var. *duriminum* Cout. in Bol. Soc. Brot. 13: 103 (1896)
23. *Allium schoenoprasum* var. *albidum* Regel in Index Seminum (LE, Petropolitanus) 1866(Suppl.): 26 (1867 publ. 1868)
24. *Allium schoenoprasum* var. *albiflorum* Alef. in Landw. Fl.: 298 (1866)
25. *Allium schoenoprasum* f. *albiflorum* Ueno in J. Jap. Bot. 44: 348 (1969), nom. illeg.
26. *Allium schoenoprasum* f. *albiflorum* J.Rousseau in Canad. J. Res., Sect. C, Bot. Sci. 28: 238 (1950), nom. illeg.
27. *Allium schoenoprasum* subsp. *alpinum* (DC.) Čelak. in Prodr. Fl. Böhmen: 91 (1867)
28. *Allium schoenoprasum* var. *alpinum* DC. in J.B.A.M.de Lamarck & A.P.de Candolle, Fl. Franç., éd. 3, 6: 319 (1815)
29. *Allium schoenoprasum* var. *alpinum* St.-Lag. in A.Cariot, Étude Fl., éd. 8, 2: 784 (1889)
30. *Allium schoenoprasum* var. *alvarense* Hyl. in Bot. Not. 1953: 353 (1953)
31. *Allium schoenoprasum* var. *brevispathum* Regel in Index Seminum (LE, Petropolitanus) 1866(Suppl.): 26 (1867 publ. 1868)
32. *Allium schoenoprasum* var. *broteri* (Kunth) Nyman in Consp. Fl. Eur.: 741 (1882)
33. *Allium schoenoprasum* var. *buhseanum* (Regel) Boiss. in Fl. Orient. 5: 250 (1882)
34. *Allium schoenoprasum* var. *caespitans* Ohwi in Fl. Jap., ed. rev.: 1437 (1965)
35. *Allium schoenoprasum* var. *duriminum* (Cout.) Cout. in Fl. Portugal: 130 (1913)
36. *Allium schoenoprasum* var. *foliosum* (Clarion ex DC.) Mutel in Fl. Franç. Herbor. 3: 305 (1836), nom. superfl.
37. *Allium schoenoprasum* var. *foliosum* Regel in Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 174 (1875), nom. illeg.
38. *Allium schoenoprasum* f. *foliosum* Juel, Cedergr. & Örtendahl in Index Seminum (UPS, Upsaliensi) 1914: 4 (1915), nom. illeg.
39. *Allium schoenoprasum* var. *gredense* (Riv.Mateos) Rivas Mart. in Anales Inst. Bot. Cavanilles 21: 281 (1963)
40. *Allium schoenoprasum* subsp. *gredense* (Riv.Mateos) Rivas Mart., Fern.Gonz. & Sánchez Mata in Opusc. Bot. Pharm. Complut. 2: 103 (1986)
41. *Allium schoenoprasum* var. *idzuense* (H.Hara) H.Hara in J. Jap. Bot. 55: 214 (1980)
42. *Allium schoenoprasum* subsp. *latiorifolium* (Pau) Rivas Mart., Fern.Gonz. & Sánchez Mata in Opusc. Bot. Pharm. Complut. 2: 103 (1986)
43. *Allium schoenoprasum* var. *latiorifolium* Pau in Bol. Soc. Aragonesa Ci. Nat. 2: 42 (1912)
44. *Allium schoenoprasum* var. *laurentianum* Fernald in Rhodora 28: 167 (1926)
45. *Allium schoenoprasum* var. *litorale* Koldaeva in Bot. Zhurn. (Moscow & Leningrad) 97: 104 (2012)
46. *Allium schoenoprasum* var. *lusitanicum* Nyman in Consp. Fl. Eur.: 741 (1882)
47. *Allium schoenoprasum* subsp. *orosiae* J.M.Monts. in Bull. Soc. Échange Pl. Vasc. Eur. Occid. Bassin Médit. 19: 110 (1984)
48. *Allium schoenoprasum* var. *pumilum* Bunge in Verz. Altai Pfl.: 26 (1836)
49. *Allium schoenoprasum* f. *pumilum* (Bunge) Bolzon in Nuovo Giorn. Bot. Ital., n.s., 20: 312 (1913)
50. *Allium schoenoprasum* subsp. *pumilum* (Bunge) K.Richt. in Pl. Eur. 1: 203 (1890)
51. *Allium schoenoprasum* f. *purpuratum* Konta in Bull. Natl. Sci. Mus. Tokyo, B 31: 158 (2005)
52. *Allium schoenoprasum* subsp. *riparium* (Opiz) Čelak. in Prodr. Fl. Böhmen: 91 (1867)
53. *Allium schoenoprasum* var. *riparium* Čelak. in Prodr. Fl. Böhmen: 91 (1867)
54. *Allium schoenoprasum* var. *schoenoprasoides* Briq. in Prodr. Fl. Corse 1: 291 (1910)
55. *Allium schoenoprasum* var. *schoenoprasoides* Briq. in Prodr. Fl. Corse 1: 291 (1910), nom. illeg.
56. *Allium schoenoprasum* subsp. *sibiricum* (L.) Syme in J.E.Smith, Engl. Bot., ed. 3, 9: 216 (1869)
57. *Allium schoenoprasum* f. *sibiricum* (L.) Bolzon in Nuovo Giorn. Bot. Ital., n.s., 20: 312 (1913)
58. *Allium schoenoprasum* var. *sibiricum* (L.) Hartm. in Handb. Skand. Fl., ed. 4: 102 (1843)
59. *Allium schoenoprasum* var. *tangoense* G.Ito, Fuse & M.N.Tamura in Acta Phytotax. Geobot. 73: 142 (2022)
60. *Allium schoenoprasum* var. *typicum* Regel in Trudy Imp. S.-Peterburgsk. Bot. Sada 3(2): 77 (1875), not validly publ.
61. *Allium schoenoprasum* f. *vegetior* Neuman in Sver. Fl.: 644 (1901)
62. *Allium schoenoprasum* var. *vulgare* Alef. in Landw. Fl.: 298 (1866)
63. *Allium scorodoprasum* var. *alvarense* Hyl. in Uppsala Univ. Årsskr. 1945(7): 113 (1945)
64. *Allium sibiricum* L. in Mant. Pl. 2: 562 (1771)
65. *Allium sibiricum* var. *schoenoprasoides* (Fr.) Fr. in Summa Veg. Scand.: 64 (1845)
66. *Allium sibiricum* *schoenoprasoides* Fr. in Exsicc. (Herb. Normale Pl. Rar. Crit. Succ.) 7: 70 (1840)
67. *Allium tenuifolium* Salisb. in Prodr. Stirp. Chap. Allerton: 235 (1796)
68. *Allium tenuifolium* Pohl in Tent. Fl. Bohem. 2: 10 (1814), nom. illeg.
69. *Allium ubinicum* Kotukhov in Turczaninowia 6: 5 (2003)
70. *Allium udinicum* Antsupova in Novosti Sist. Vyssh. Rast. 26: 38 (1989)
71. *Cepa tenuifolia* (Salisb.) Gray in Nat. Arr. Brit. Pl. 2: 114 (1821 publ. 1822)
72. *Porrum sibiricum* (L.) Schur in Enum. Pl. Transsilv.: 670 (1866)
73. *Schoenissa rosea* Salisb. in Gen. Pl.: 91 (1866), not validly publ.

BOTANICAL DESCRIPTION

Bulbs are oval shaped and often clumped together. The skin of the bulbs has a grayish brown colour, with yellow or purplish tints, and the texture of carton paper. The development of elongated rhizomes and of false bulbs are advanced character states (synapomorphies), usually clustered, ovoid-cylindric, 0.5–1 cm in diameter; tunic brown or tinged with yellow, papery, lacinate, sometimes fibrous at apex. The leaves grow in clumps of 2–5, slightly shorter than scape, 2–6 mm wide, terete, fistulose, smooth

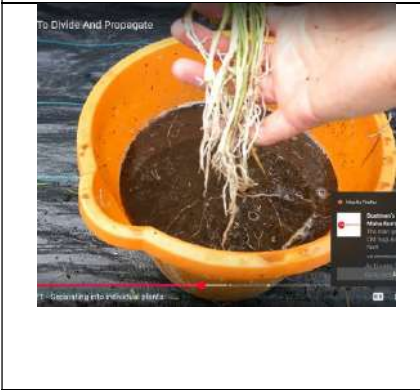
or scabrous denticulate. Chives branching results from where lateral initiation occurs after the development of every two or three leaves (Poulson, 1990), and thus plants develop clusters of shoots. Scape 10–50 (60) cm, terete, covered with leaf sheaths for 1/3–1/2 its length, smooth or scabrous-denticulate. After seeding, chives flower in the second year and each year afterwards. The long and thin flower scape is cylindrical in shape, hollow and smooth. Umbel subglobose, are densely flowered. The perianth is purple-red to white (or pale pink), tepal twice the length of filaments; polymorphous spires. Six needle shaped petals are of the same height. The pistil does not protrude out of the petals. The flowers do not produce much pollen and seldom produce viable seeds. Chives are generally an out-crosser, and flowers are insect pollinated, but selfing frequently occurs as well. Chives can be cultivated from seeds or from division (Chen, 2012b). The chive is a bulb-forming herbaceous perennial plant, growing to 30–50 cm tall. The bulbs are slender conical, 2–3 cm long and 1 cm broad, and grow in dense clusters from the roots. The leaves are hollow tubular, up to 50 cm long, and 2–3 mm in diameter, with a soft texture, although, prior to the emergence of a flower from a leaf, it may appear stiffer than usual. The flowers are pale purple, star-shaped with six tepals, 1–2 cm wide, and produced in a dense inflorescence of 10-30 together; before opening, the inflorescence is surrounded by a papery bract. The seeds are produced in a small three-valved capsule, maturing in summer. The herb flowers from April to May in the southern parts of its habitat zones and in June in the northern parts (Anonymous, 2013).

Chives are a bulb-forming herbaceous perennial plant, growing to 25 cm tall. The bulbs are slender, conical, 2–3 cm long and 1 cm broad, and grow in dense clusters from the roots. The scapes (or stems) are hollow and tubular, up to 50 cm long and 2–3 mm across, with a soft texture, although, prior to the emergence of a flower, they may appear stiffer than usual. The grass-like leaves, which are shorter than the scapes, are also hollow and tubular, or terete (round in cross-section). The flowers are pale purple, and star-shaped with six petals, 1–2 cm wide, and produced in a dense inflorescence of 10–30 together; before opening, the inflorescence is surrounded by a papery bract. The seeds are produced in a small, three-valved capsule, maturing in summer. The herb flowers from April to May in the southern parts of its habitat zones and in June in the northern parts (Wikipedia, 2024). Chives are a bulb-forming herbaceous perennial plant, growing to 25 cm tall. The bulbs are slender, conical, 2–3 cm long and 1 cm broad, and grow in dense clusters from the roots. The scapes (or stems) are hollow and tubular, up to 50 cm long¹ and 2–3 mm across, with a soft texture, although, prior to the emergence of a flower, they may appear stiffer than usual. The grass-like leaves, which are shorter than the scapes, are also hollow and tubular, or terete (round in cross-section). The flowers are pale purple, and star-shaped with six petals, 1–2 cm wide, and produced in a dense inflorescence of 10–30 together; before opening, the inflorescence is surrounded by a papery bract. The seeds are produced in a small, three-valved capsule, maturing in summer. The herb flowers from April to May in the southern parts of its habitat zones and in June in the northern parts (Inaturalist, 2024). The plant is a hardy perennial. The bulbs grow very close together in dense tufts or clusters, and are of an elongated form, with white, rather firm sheaths, the outer sheath sometimes grey. The slender leaves appear early in spring and are long, cylindrical and hollow, tapering to a point and about the thickness of a crow's quill. They grow from 6 to 10 inches high. The flowering stem is usually nipped off with cultivated plants (which are grown solely for the sake of the leaves, or 'grass'), but when allowed to rise, it seldom reaches more than a few inches to at most a foot in height. It is hollow and either has no leaf or one leaf sheathing it below the middle. It supports a close globular head, or umbel, of purple flowers; the numerous flowers are densely packed together on separate, very slender little flower-stalks, shorter than the flowers themselves, which lengthen slightly as the fruit ripens, causing the heads to assume a conical instead of a round shape. The petals of the flowers are nearly half an inch long; when dry, their pale-purple colour, which has in Parts a darker flush, changes to rose-colour. The anthers (the pollen-bearing part of the flower) are of a bluish-purple colour. The seed-vessel, or capsule, is a little larger than a hemp seed and is completely concealed within the petals, which are about twice its length. The small seeds which it contains are black when ripe and similar to Onion seeds (Grieve, 2024).

Chives are small, dainty, onion-like plants that grow in clumps, reaching about 10 inches in height. They are hardy perennials with decorative, light purple flowers. No herb or vegetable garden should be without chives. A perennial member of the onion family, this culinary herb lends a flavor more delicate than onion to salads, soups, sauces, herbal butters, and vinegars. The bright green hollow leaves can be used fresh or frozen and the edible lavender flowers can be used in salads as well as flower arrangements. Chives can be started from seed or grown from transplants in spring in full sun and well-drained soil. Begin to harvest when plants are about 6 inches tall by snipping leaves from the base of the plant. Divide plants every three years in the spring. As a bonus, this easy-to-grow perennial makes an eye-catching edging for ornamental beds or containers outside your kitchen door while providing fresh flavor all season (Extension, 2024). The chive is a bulb-forming herbaceous perennial plant, growing to 30-50 cm tall. The bulbs are slender, conical, 2-3 cm long and 1 cm broad, and grow in dense clusters from the roots. Unlike regular onions, there is no large bulb formed underground, and the leaves are the source of the onion flavor. The leaves are hollow, tubular, up to 50 cm long, and 2-3 mm in diameter, with a soft texture, although, prior to the emergence of a flower from a leaf, it may appear stiffer than usual. The flowers are pale purple, star-shaped with six tepals, 1-2 cm wide, and produced in a dense inflorescence of 10-30 together; before opening, the inflorescence is surrounded by a papery bract. The seeds are produced in a small three-valved capsule, maturing in summer. The herb flowers from April to May in the southern parts of its habitat zones and in June in the northern parts, such as Sweden (Plantgrower, 2024). The chive is a bulb-forming herbaceous perennial plant, growing to 30-50 cm tall. The bulbs are slender conical, 2-3 cm long and 1 cm broad, and grow in dense clusters from the roots. The leaves are hollow tubular, up to 50 cm long, and 2-3 mm in diameter, with a soft texture, although, prior to the emergence of a flower from a leaf, it may appear stiffer than usual. The flowers are pale purple, star-shaped with six tepals, 1-2 cm wide, and produced in a dense inflorescence of 10-30 together; before opening, the inflorescence is surrounded by a papery bract. The seeds are produced in a small three-valved capsule, maturing in summer. The herb flowers from April to May in the southern parts of its habitat zones and in June in the northern parts (Chemeurope, 2024). Bulbs lanceoloid, clustered on a short rhizome; outer coat membranous with persistent parallel veins. Scapes terete, hollow, 15–70 cm. Leaves 2 to 5, terete, hollow, 1–7 mm wide, persistent. Umbel congested with 15 to 50 flowers; pedicels 2–10 mm long; bracts 2, ovate to suborbicular, apiculate. Flowers pink to rose; tepals 8–12 mm long; ovary crestless; stamens included. Seed surface minutely roughened (Fieldguide, 2024).

This herbaceous perennial plant is 6-20" tall, consisting of a dense tuft of basal leaves from tightly clustered bulbs. The basal leaves are erect, ascending, or arching-spreading; they are medium green, filiform, terete, hollow, glabrous, and sometimes glaucous. One or more flowering stalks develop from within the basal leaves. These stalks are more stiffly erect than the leaves; they are 8-20" long, medium green, filiform, terete, and glabrous. Usually, the stalks are leafless, although on rare occasions 1-2 cauline leaves may develop from an individual stalk. At the apex of each stalk, there is a crowded umbel of 30-50 flowers that spans about 1-1½" across; this umbel is held erect and it is globoid to subgloboid (globoid, but slightly flattened) in shape. Initially, the umbel is enclosed by a pair of membranous spathes with a sheath-like appearance, but the latter shrivel away when the flowers begin to bloom. Each flower is up to 2/3" long, consisting of 6 pink or lavender tepals, 6 stamens, and a pistil with a single white style. The filaments of the stamens are white, while their anthers are variably colored. The tepals are narrowly elliptic in shape and strongly ascending; they often have fine lines of purple where their midribs occur. The style has a knobby tip. At the bases of these flowers, there are short pedicels up to ¼" long; these pedicels are largely hidden by the flowers when the latter are in bloom. Both the foliage and flowers have a mild onion-like aroma. The blooming period occurs from late spring to early summer, lasting about 3-4 weeks. Afterwards, individual flowers are replaced by 3-valved seed capsules (3-4 mm. across) that split open to release their seeds. These seeds are 2-2.5 mm. (less than 1/8") in length with a 3-angled ellipsoid shape; 2 sides of each seed are flat, while the remaining side is curved. In addition, the seeds are black, somewhat wrinkled, and glabrous. The root system consists of slender bulbs that are ellipsoid in shape and up to ¾" in length; these bulbs have fibrous roots underneath. The outermost layers of the bulbs are brown and membranous. Clonal offshoots are created by the formation of new bulbs in the ground. This plant also reproduces by reseeding itself. The leaves die down during the winter (Illinois, 2024).

Botanical Description of chives are given in Fig. 2.

		
Seeds	Clump	Clump
		
Separate	Individual seedlings	
		
Seedlings sprouting	Transplanted seedlings	Plants

Continue

		
Leaves	Leaves	Cut leaves
		
Flower buds	Flowers	Flowers
		
Plants with bulbs	Seed stock	Seed stocks
		
Umbels	Seeds separated	Seeds
Fig. 2. Botanical Description		

Pollination: Chives, a member of the onion family, are insect-pollinated, with flowers attracting bees like honeybees and bumblebees, leading to the production of small, black seeds. Here's a more detailed explanation (Google, 2024d):

Pollination: Chives rely on insects, particularly bees, for pollination.

Pollinators: Honeybees and bumblebees are frequent visitors to chive flowers, facilitating pollination.

Flower Characteristics: Chives have purple flowers that are attractive to pollinators.

Seed Production: After successful pollination, chive flowers produce small, angular black seeds enclosed in a three-valved capsule.

Isolation: If you're growing different chive varieties, ensure adequate spatial isolation or use mechanical isolation techniques to prevent cross-pollination.

Harvesting Seeds: Collect the flower heads when they are completely dry to harvest the seeds.

Attracting Pollinators: Chives are known to attract pollinators, making them a good addition to a pollinator-friendly garden.

Other Pollinators: While bees are the primary pollinators, other insects may also contribute to pollination.

Pollination, crossing, and isolation: Chives are insect-pollinated and will therefore require to be isolated at an adequate distance depending on your surroundings. While different chive varieties will cross with one another, they won't cross with garlic chives. If several different varieties are grown simultaneously and spatial isolation is not possible, using a mechanical isolation technique such as the alternate day caging method will be necessary. The flower heads are collected when they are completely dry (Learn, 2024). Chives are insect-pollinated, and therefore require adequate isolation depending on your surroundings. While chives are generally out-crossers, selfing frequently occurs (Google, 2024).

GENETICS AND CYTOGENETICS

The inheritance of nine isozyme systems in selfed progenies of chives was studied electrophoretically. The isozyme systems studied were malate-dehydrogenase (MDH), phosphoglucose isomerase (PGI), triosephosphate-isomerase (TP1), diaphorase (D1A), menadione-reductase (MDR), esterase (EST), glutamate-oxalacetate-transaminase (GOT), hexokinase (HK) and superoxide-dismutase (SOD). Segregation results of Goodness-of-Fit tests against the expected 1:2:1 and 3:1 ratios for codominant and dominant inheritance, respectively, led to the identification of 16 isozyme loci whose banding patterns are given in this paper. The first results on linkage relationships between isozyme loci and between the *MDR-3-locus* and a male sterility gene are given. These results and further studies will be used to mark important characters in chives (Eickmeyer *et al.*, 1990). The mitochondria of chive plants with normal N or male-sterile S cytoplasms have been examined by restriction fragment analysis and Southern hybridizations of mitochondrial DNA (mtDNA) and in organello protein biosynthesis. Restriction fragment patterns of the mtDNA differed extensively between N- and S-cytoplasms. The percentage of fragments with different mobility varied between 44–48% depending on the restriction enzyme used. In contrast to mtDNA, the restriction fragment patterns of the chloroplast DNA from N- and S-cytoplasms were identical. The organization of the analyzed mitochondrial genes *coxII*, *coxIII*, *nad1* and *nad3* was different in N- and S-cytoplasms. Comparison of mitochondrial proteins analyzed by in organello translation revealed an 18-kDa protein present only in S-cytoplasm. The restorer gene *X* suppressed the synthesis of that protein in S-cytoplasm. Thus, the 18-kDa protein seems to be associated with the cytoplasmic male-sterile phenotype (Potz and Tatlioglu, 1993). Genetic analysis of three naturally occurring flower colour variants of *Allium schoenoprasum* revealed the involvement of three diallelic loci in the control of flower colouration: *W/w* controls the presence/absence of pigment, *D/d* controls the distribution of pigment in the tepals (perianth segments), and *P/p* controls pigment hue. There is no evidence of linkage between the three loci (Stevens and Bougourd, 1988).

The economic importance of chives is quite small compared to some other vegetable plants. In *Allium schoenoprasum* there is a well defined cms-system, in which concerning the mitochondrial (mt) genome two different cytoplasms, (S) for male sterility, (N) for male fertility, and three nuclear genes are involved. The male sterility caused by the (S) cytoplasm is reversed by the dominant restorer gene *X*, so that only plants of the genetic constitution (S)xx are male sterile. The dominant temperature gene *T* functions like a restorer gene, but only under high constant temperatures of 24°C [constitution of temperature sensitive cm plants: (S)xx*Tt* or (S)xx*TT*]. The recessive gene *a* is responsible for tetracycline sensitivity of the cm in chives. Plants, which are sensitive to tetracycline (S)xxaa] have a reversible fertility after treatment with tetracyclines. Fertility due to high temperatures is reversible too (Tatlioglu, 1993). In chives, there are four other types of male sterility, which have come up in different varieties or breeding lines. Other nuclear genes not identical with the gene *x* are involved in their inheritance. One of these nuclear genes even causes male sterility in the (N) cytoplasm. It has not been finally established whether these new forms are genic or cytoplasmic male sterility (Tatlioglu, 1993). Genetic analysis of three naturally occurring flower color variants of *Allium schoenoprasum* revealed the involvement of three diallelic loci in the control of flower colouration: *W/w* controls the presence/absence of pigment, *D/d* controls the distribution of pigment in the tepals (perianth segments), and *P/p* controls pigment hue. There is no evidence of linkage between the three loci (Tatlioglu, 1993; Stevens and Bougourd, 1998). Chives exhibit a monopodial growth habit, and only become sympodial after the formation of the first generative meristem. Thereafter, *Allium* plants produce renewal bulbs and flowers every year. Temperatures play the most important role in normal scape elongation and flowering of *Allium* plants, although light conditions can markedly affect this process. Flowering usually does not occur if temperatures are above 18°C. Like other major cultivated *Allium* crops, cold exposure is required for floral induction in chives (Chen, 2012b). In chives male sterility is conditioned by genetic male sterility (GMS), which is controlled by a single nuclear gene with recessive inheritance (Engelke and Tatlioglu, 2000). An alternative cytoplasmic male sterility (CMS) depends on the interaction between the cytoplasm (S) and a single nuclear fertility restoration locus (X). Fertility of some male-sterile plants, however, can be regained under favourable environmental conditions. Hence, exposure to a constant temperature of 24 °C resulted in production of viable pollen. This temperature sensitivity is controlled by a single dominant allele (*t*) (Chen, 2012b).

The most prominent base number chromosomes in *Allium* is $x=8$, with few records of $x=7$, 10, 11 (Bhowmick *et al.*, 2023). Chromosome number $2n = 16, 24, 32$ (Chen, 2012a). Chives, specifically *Allium schoenoprasum*, have a diploid chromosome number of $2n = 16$. They are a good subject for studying meiosis due to their easily dissected anthers and relatively large, easily

stainable chromosomes. Cytogenetics involves the study of chromosomes and their behavior during cell division, and chives are often used in biology labs to observe these processes. Chives generally have a diploid chromosome number of $2n = 16$ (8 pairs).

GENETIC DIVERSITY

According to available research, the genetic diversity of chives in India is likely to be relatively limited compared to other regions due to the widespread cultivation of a few dominant varieties, although studies specifically focusing on Indian chives' genetic diversity are not readily available; however, research on related *Allium* species like garlic indicates significant variation within the Indian germplasm, which could also be true for chives depending on the specific region and cultivar studied (Stevens and Bougourd, 1988). Mitochondrial genome diversity in chives (*Allium schoenoprasum* L.) was investigated with respect to different forms of male sterility. Cytoplasmic male-sterile (CMS) and restored genotypes of the known CMS system, compared to plants of the *wi*-, the *st1*- and the *st2*-sterility types and additional fertile plants of different origin were examined by means of RFLP analyses using mitochondrial gene probes. Besides the (S)-cytoplasm of the CMS system four additional cytoplasms were distinguished that differed in the organisation of their mitochondrial genomes. There is consequently a high degree of variability of the mitochondrial genome in chives, especially when compared with the closely related onion. A possible function of the *atp9* gene in generating the different cytoplasm types of chives is discussed in relation to the origin of known CMS sequences in other plant species. The existence of different cytoplasm types offers the opportunity for further characterisation of the *wi*-, *st1*- and *st2*-sterility systems with respect to cytoplasmic factors which might be causally related to them. Whether these new sterilities are CMS or GMS (genic male sterilities) is of interest to plant breeders in order that restrictions on the genetic basis used in hybrid seed production be avoided (Engelke and Tatlioglu, 2000). Chives, belonging to the *Allium* genus, exhibit genetic diversity, with *Allium schoenoprasum* (common chives) and *Allium tuberosum* (garlic chives) being notable examples, alongside other species like *Allium ledebourianum* and *Allium nutans*. Common chives (*Allium schoenoprasum*): This is the most widely known chive species, native to Europe and Asia, and possibly North America. Variations within *Allium schoenoprasum*: Some specimens, like those found in northern Maine, exhibit variations in growth habit (solitary instead of in clumps) and flower color (dingy grey) (Goole, 2024b). Nineteen SSR markers were employed to study the divergence and population structure of 95 *Allium* accessions which includes species, varieties, and interspecific hybrids, yielded 92 polymorphic loci, averaging 4.84 loci per SSR. PIC values range between 0.24 (ACM 018) and 0.98 (ACM 099). The cross transferability of ACM markers among *Allium* species ranges from 1.33 to 10.53 per cent, which is relatively low. The genotypes investigated were clustered into four primary clusters A, B, C, and D with 13 sub clusters I-XIII, conferring to the clustering results. The population structure investigations also found that K is a peak at value 4, implying that the population is predominantly segregated into four distinct groups, which associates the clustering pattern. The employed SSR markers adeptly unravel the complexities of diversity within alliums, holding promise for refining future breeding programs targeting elite progenies (Gowd *et al.*, 2024).

BREEDING

Propagation (Google, 2024).

While chives can be grown from seeds, vegetative propagation (clump division) is more common for commercial cultivation due to the long crop cycle (11-15 weeks) when using seeds. Here's a more detailed explanation of chive breeding:

- **Seed Propagation:** Chives can be easily propagated by dividing clumps every few years. This will improve the productiveness and health of the plants, and prevent them from becoming overly congested. Chives can be grown from seeds, sown outdoors in the spring or early fall. Seeds typically germinate within a few weeks at a temperature between 15-24°C. Seedlings need to be established before being transplanted to their final location. While chives can be grown from seeds, vegetative propagation (clump division) is more common for commercial cultivation due to the long crop cycle (11-15 weeks) when using seeds.
- **Vegetative Propagation (Clump Division):** Chives can be easily propagated by dividing established clumps of chives into smaller clumps in the spring. Timing should be done every few years to prevent overcrowding and maintain healthy, strong growth. Carefully extract the existing plant from the soil, break the clump into separate plants, and replant them. Plant divided plants 20 to 30 cm apart. Keep the plants moist to aid in the establishment of the root system. Chives can be harvested at any time once plants are established, simply snip the leaves with scissors, leaving about 3 cm of green on the plant.

Propagation (Google, 2024a).

Vegetative: Dividing existing clumps in spring is the most common and efficient method, especially for commercial cultivation.

Seed: Chives can be grown from seed, but the crop cycle is longer (11-15 weeks), making seed propagation less suitable for commercial purposes.

Breeding Objectives (Google, 2024).

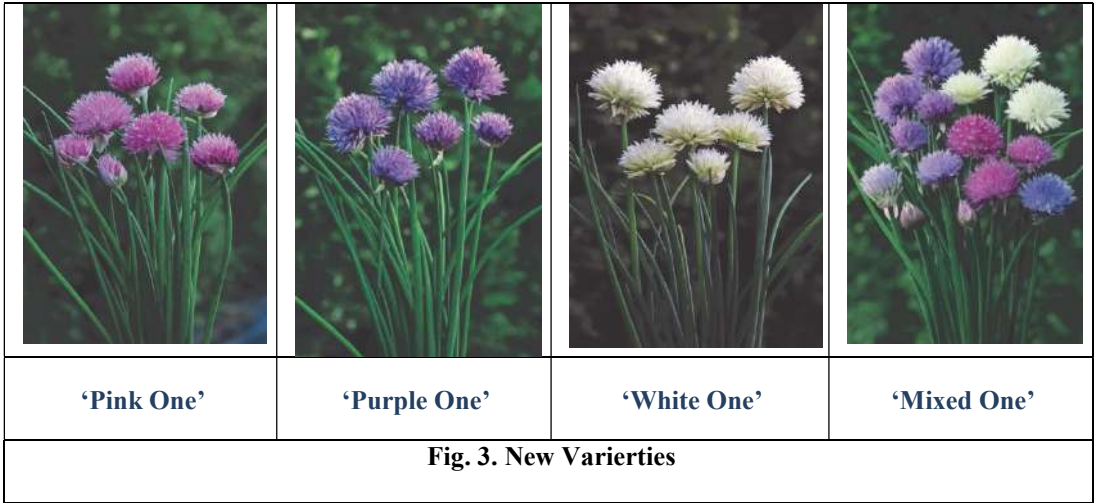
Forcing Ability: The ability to produce leaves and flowers under various conditions.

Homogeneous Growth: Ensuring plants grow uniformly.

Tillering Ability: The ability to produce multiple stems from a single plant.

Desired Leaf Characteristics: Focusing on traits like leaf size, shape, and flavor.

Varieties: Four seed-raised varieties of chives in distinct flower colours. All three mature a little shorter than the chives most commonly found in gardens, flowering at about 30cm in height, making them ideal for smaller spaces or container growing. ‘Pink One’ (bright pink), ‘Purple One’ (rich violet-purple) and ‘White One’ (pure white) are offered as separate colours. ‘White One’ is especially useful in potagers and ornamental herb gardens. All three are also available blended into a mixture, ‘Mixed One’ (Fig. 3) (Rice, 2023).



‘Curly Mauve’ is a hybrid that I named, being one of the better "curly types" and a fascinating plant on many accounts. Many forms of chives actually have prostrate foliage; this one starts out prostrate, later becoming a misty blue-gray dance of medusa whips curling in all directions. In June the stems stand erect above the short curled foliage to open a sea of grayed-lavender chive florets. The five photos below show a growth progression. "Curly Mauve seedling", a spontaneous garden seedling that caught my eye in early spring because of the octopus-like rosette, the blue-gray curled tentacles swirling around flat on the ground (Foodgardening, 2024).

Two other forms named and photographed by Mark McDonough are ‘Marsha’, a very deep purple form of chives, named for his friend Marsha Russell who had the deep form appear in her garden. Seed grown plants will vary, but a good percentage will yield similar purple forms. It grows to 2’(60 cm) tall (Foodgardening, 2024). Lots of plants go around as *Allium schoenoprasum* ‘Alba’, but it’s rather ridiculous given that numerous forms of chives, from robust 2’ (60 cm) tall plants to little 6" (15 cm) dwarf forms, might have white flowers. It’s better to give these various white forms cultivar names. This seedling that I selected and named was derived from another dwarf white cultivar (that I also named) called ‘Corsican White’, the latter a miniature white-flowered form from Corsica. The selection named ‘Snowcap’ is a semi-dwarf, growing 12"-15" (30-38 cm) tall, with pristine white flowers (Foodgardening, 2024).

Cultivars (Mahr, 2024).

- ‘Album’ is a white flowered form
- ‘Curly Mauve’ has prostrate foliage that curls in different directions and has gray-lavender flowers held erect above the short curled foliage.
- ‘Forescate’ is larger than the species, growing 18-20" tall and with larger, brighter flowers.
- ‘Marsha’ is a very deep purple form.
- ‘Pink Giant’ is taller than other types, with leaves about twice the size of the species, and large, clear pink blossoms.
- ‘Profusion’ is a sterile form that flowers over a longer period than the species.
- ‘Snowcap’ is a dwarf white-flowered cultivar.

Cultivars (IE, 2024).

- ‘Grolau’ Chives - This Swiss strain has been developed for indoor culture and greenhouse forcing. Extra strong flavor and thick, dark leaves. Less susceptible to becoming leggy.
- ‘Nelly’ Chives - Fine texture leaves, blue-green in color, uniform upright habit.
- ‘Profusion’® Chives - Prolific production of leaves and flowers. Flowers are sterile and don’t produce seeds. Good variety for pot culture.
- ‘Staro’ Chives – Extra thick dark leaves.
- Garlic Chives – Also called Chinese Chives. Similar in appearance to garden chives but leaves are flat and not round and flowers are white not pink.

Cultivars (Dhcrop, 2018).

BARI Chive 1

USES

Chives are cultivated for use in salads and soups, and many consider them an indispensable ingredient in omelets. They have been much used for flavoring in continental Europe, especially in Catholic countries. Chives are eaten fresh or dehydrated, the latter being the most common processed form today. The flavor of the chopped leaves remains stable for several months when deep-frozen or freeze-dried (Peterson, 2000). In culinary uses, chives leaves (straws) are shredded for use as condiment for fish, potatoes and soups. Chives are a commonly used household herb, frequent in gardens and in grocery stores. It has insect-repelling properties which can be used in gardens to control pests (Anonymous, 2013). Chives are grown for their leaves, which are used for culinary purposes as flavoring herb, and provide a somewhat milder flavour than those of its neighbouring *Allium* species. Chives have a wide variety of culinary uses, such as in traditional dishes in France and Sweden, among others. In his 1806 book *Attempt at a Flora (Försök til en flora)*, Retzius describes how chives are used with pancakes, soups, fish and sandwiches. It is also an ingredient of the *gräddfil* sauce served with the traditional herring dish served at Swedish midsummer celebrations. The flowers may also be used to garnish dishes. In Poland chives are served with quark cheese. Chives are one of the "fines herbes" of French cuisine, which also include tarragon, chervil and/or parsley. Chives can be found fresh at most markets year-round, making it a readily available herb; it can also be dry-frozen without much impairment to its taste, giving home growers the opportunity to store large quantities harvested from their own garden (Anonymous, 2013).

Chives are a commonly used in culinary purposes. The scapes and the unopened, immature flower buds are diced and used as an ingredient for fish, potatoes, soups, and other dishes. The edible flowers can be used in salads (Dhcrop, 2018). Chives have slender clustered bulbs and cylindrical hollow leaves. Umbels are dense, subglobose to ovoid and have numerous pale purple flowers born on pedicels that vary in length (Stefanaki and Andel, 2021). Sweet onion-scented organosulfur compounds make up the essential oils of chives, dominant compounds being methyl propyl trisulfide and bis-(2-sulphydryethyl)-disulfide (Stefanaki and Andel, 2021). Unlike other culinary species of the genus *Allium*, such as onion, garlic or leek, the bulbs of chives are not eaten. The leaves are used as a condiment, most frequently for garnish or in salads. They are popular in France, where a soup of chives is made based on chicken or vegetable bouillon. In Slovenia, *želševka* is a variation of the traditional rolled cake *potica* with chives filling. In Spain, chives are used to garnish fish and seafood dishes (Stefanaki and Andel, 2021). Avoid cooking Chives to get their highest nutritive value. Instead, add chopped chives to vinegar, oil, ghee, or garnish your food with fresh or dried chives just before eating. Buy other herbs online (Ugao, 2022).

Chives impart a delicious, subtle, onion-like flavor to foods. They are most flavorful when fresh but can also be dried or frozen (Extension, 2024). Chives are grown for their leaves, which are used for culinary purposes as a condiment, which provide a somewhat milder onion flavor than other *Allium* species. Culinary uses for chives include shredding the leaves (straws) for use as condiment for fish, potatoes and soups. Chives may be purchased fresh or frozen and freeze-dried. Chives can be found fresh at most markets year-round, making it a readily available spice herb. Fresh leaves can be stored in a plastic bag for up to a week in a refrigerator. Chives can also be dry-frozen without much impairment to their taste, giving home growers the opportunity to store large quantities harvested from their own garden. In order to retain flavor, leaves should be added near the end of the cooking time (Plantgrower, 2024). Leaves can be used to flavor salads, dips, soups, stews, vinegars, cheese dishes sour cream and butter. Flavor is much milder and more subtle than other members of the onion family (IE, 2024). Flowers can be used in salad. Leaves can be used in salad, omelettes, sandwiches, cream cheese and so much more (Victoria, 2024).

The Chive contains a pungent volatile oil, rich in sulphur, which resent in all the Onion tribe and causes their distinctive smell and taste. It is a great improvement to salads - cut fresh and chopped fine-and may be put not only into green salads, but also into cucumber salad, or sprinkled on sliced tomatoes. Chives are also excellent in savoury omelettes, and may be chopped and boiled with potatoes that are to be mashed, or chopped fresh and sprinkled, just before serving, on mashed potatoes, both as a garnish and flavouring. They may also be put into soup, either dried, or freshly cut and finely chopped, and are a welcome improvement to homemade sausages, croquettes, etc., as well as an excellent addition to beefsteak puddings and pies. Chives are also useful for cutting up and mixing with the food of newly-hatched turkeys. Parkinson mentions Chives as being cultivated in his garden, among other herbs (Grieve, 2024). Chives are grown for their scapes and leaves, which are used for culinary purposes as a flavoring herb, and provide a somewhat milder onion-like flavor than those of other *Allium* species. The edible flowers are used in salads, or used to make blossom vinegars. Both the scapes and the unopened, immature flower buds are diced and used as an ingredient for omelettes, fish, potatoes, soups, and many other dishes. Chives have a wide variety of culinary uses, such as in traditional dishes in France, Sweden, and elsewhere. In his 1806 book *Attempt at a Flora (Försök til en flora)*, Anders Jahan Retzius describes how chives are used with pancakes, soups, fish, and sandwiches. They are also an ingredient of the *gräddfil* sauce with the traditional herring dish served at Swedish midsummer celebrations. The flowers may also be used to garnish dishes. In Poland and Germany, chives are served with quark. Chives are one of the *fines herbes* of French cuisine, the others being tarragon, chervil and parsley. Chives can be found fresh at most markets year-round, making them readily available; they can also be dry-frozen without much impairment to the taste, giving home growers the opportunity to store large quantities harvested from their own gardens (Wikipedia, 2024).

Chives are grown for their scapes and leaves, which are used for culinary purposes as a flavoring herb, and provide a somewhat milder onion-like flavor than those of other *Allium* species. The edible flowers are used in salads, or used to make blossom vinegars. Both the scapes and the unopened, immature flower buds are diced and used as an ingredient for omelettes, fish,

potatoes, soups, and many other dishes. Chives have a wide variety of culinary uses, such as in traditional dishes in France, Sweden, and elsewhere. In his 1806 book *Attempt at a Flora (Försök til en flora)*, Anders Jahan Retzius describes how chives are used with pancakes, soups, fish, and sandwiches. They are also an ingredient of the *gräddfil* sauce with the traditional herring dish served at Swedish midsummer celebrations. The flowers may also be used to garnish dishes. In Poland and Germany, chives are served with quark. Chives are one of the *fines herbes* of French cuisine, the others being tarragon, chervil and parsley. Chives can be found fresh at most markets year-round, making them readily available; they can also be dry-frozen without much impairment to the taste, giving home growers the opportunity to store large quantities harvested from their own gardens (Inaturalist, 2024). Group, mass or use as an edger in herb gardens and vegetable gardens. Also effective as an ornamental (leaves may still be harvested) in rock gardens or border fronts. Also may be grown in pots, or divisions may be potted up in fall, for overwintering and continued harvest on a cool kitchen window sill (Missouri, 2024). Chives are grown for their leaves, which are used for culinary purposes as condiment, which provide a somewhat milder flavour than its neighbouring *Allium* species. Chives have a wide variety of culinary uses, such as in traditional dishes in France and Sweden, among others. In his 1806 book *Attempt at a Flora (Försök til en flora)*, Retzius describes how chives are used with pancakes, soups, fish and sandwiches. It is also an ingredient of the *gräddfil* sauce served with the traditional herring dish served at Swedish midsummer celebrations. The flowers may also be used to garnish dishes. Chives are one of the "fines herbes" of French cuisine, which also include tarragon, chervil and/or parsley. Chives can be found fresh at most markets year-round, making it a readily available spice herb; it can also be dry-frozen without much impairment to its taste, giving home growers the opportunity to store large quantities harvested from their own garden (Chemeurope, 2024). Chives are also commonly used in soups and dips. An unusual and colorful twist is to use the flower as an exciting garnish for a soup, or broken up it can be spread over a salad. Chives can be used in many places where onions might also enter. Try putting them in a stuffing recipe, or adding to most soups. They are very versatile, great fresh or dried. Generally, put them in late during cooking to preserve their crispness or snipped and sprinkled on food just before serving for seasoning (Ellingsworth, 2024).

Provides vitamin C, potassium, calcium, and phytochemicals including quercetin (Phytotheca, 2025). Leaves are a mild antiseptic, promote digestion, and simulate appetite. Phytochemicals found in the plant may provide anti-cancer properties (Phytotheca, 2025). Use your fresh Onion chives in this tasty recipe for Mashed Cauliflower with Roasted Garlic and Chives (Phytotheca, 2025).

NUTRITION

As with the other alliums, the nutritional content of chives varies by variety, ecological conditions, and climate. One hundred grams of chives will generally provide about 30 kilocalories of energy, 3.27 g of protein, 0.73 g of fat, and 4.35 g of carbohydrate. Approximately one-half cup of fresh chives delivers 11.5 percent of the RDA of calcium (92 mg), 16 percent of iron (1.6 mg), 12 percent of magnesium (42 mg), 43.4 percent of vitamin A (434.43 mcg RE), 96.8 percent of vitamin C (58.1 mg), and 52.5 percent of folacin (105 mg). Chives are high in potassium (296 mg) and low in sodium (3 mg). They contain small amounts of copper, phosphorus, and zinc. Chives have 2606.59 mcg of beta-carotene and 0.46 mg of vitamin E (alpha-tocopherol 0.37 mg, beta-tocopherol 0.17 mg, gamma-tocopherol 0.17 mg, and delta-tocopherol 0.09 mg) and small amounts of thiamine, riboflavin, niacin, pantothenic acid, and vitamin B6 (Peterson, 2000). Chemically, chives are composed mainly of carbohydrates, proteins and amino acids, as well as many other vitamins and minerals. The unique spicy flavour comes mostly from volatile sulphur and glucosides. Studies into the chemistry of *Allium* flavour began in the 18th century. So far, much has been learned about *Allium* chemistry, although many questions still remain. We have learned that the flavour is the result of a multifaceted interaction among many different compounds, and we have also begun to understand the factors that affect the quality and intensity of the flavour of *Allium*. The flavour substances of various *Allium* species depend on the quantitative differences in the S-alk(en)yl cysteine sulfoxides (ACSOs). The Salk(en)yl cysteine sulfoxides (ACSOs), when hydrolyzed by the enzyme allinase, give rise to the flavour and pungency characteristic of the *Allium* plants (Chen, 2012d). Eating chives may help improve a person's sleep and bone health. Chives are a nutrient-dense food. This means that they are low in calories but high in beneficial nutrients, including vitamins, minerals, and antioxidants. That said, to get a significant amount of these nutrients, a person would have to eat a large quantity of chives. Instead, people often use chives as a garnish. A common serving is about 1 tablespoon (tbsp), or 3 grams. According to the United States Department of Agriculture (USDA) Trusted Source, 1 tbsp of chopped chives provides the following nutrients (Ware, 2024): energy: 0.9 calories, vitamin K: 6.38 micrograms (mcg), or 5% of the Daily Value (DV), vitamin C: 1.74 milligrams (mg), or 2% of the DV, folate: 3.15 mcg, or 1% of the DV, vitamin A: 6.43 mcg, or 1% of the DV, calcium: 2.76 mg, or less than 1% of the DV and potassium: 8.88 mg, or less than 1% of the DV. While a tablespoon of chopped chives is a source of protein, calcium, Vitamins A, C and K, and folate, it's rare to eat even that amount given that European chives are mainly used as a garnish. Chives contain allicin, an organosulfur compound (also present in garlic) that has been studied for its potential ability to control cholesterol and blood pressure. They are also rich in quercetin, a disease-fighting, anti-inflammatory antioxidant that may, among other things, help fight plaque buildup in arteries (Foodprint, 2024).

HEALTH BENEFITS

Chives have some antibacterial effects. Extracts of chives possess tuber-culostatic activity against human, avian, and bovine strains. In addition, aqueous extracts of chives have exhibited significant activity against leukemia in mice (Peterson, 2000). The medical properties of chives are similar to those of garlic, but weaker; the faint effects in comparison with garlic are probably the main reason for its limited use as a medicinal herb. Containing numerous organosulfur compounds such as allyl sulfides and alkyl sulfoxides, chives are reported to have a beneficial effect on the circulatory system. As chives are usually served in small amounts and never as the main dish, negative effects are rarely encountered, although digestive problems may occur following over-

consumption. Chives are also rich in vitamins A and C, contain trace amounts of sulfur, and are rich in calcium and iron (Anonymous, 2013). Chives contain multiple vitamins and minerals including: Vitamin K, A and C, calcium, iron, magnesium, phosphorus, potassium, and sodium. Chives are known to be a mild anti-inflammatory. They have some antibiotic properties, like the other plants in the allium group (onions, garlic, *et al*). Scientific research shows that chives may stimulate the body's digestion of fat. Eaten regularly, chives may help lower blood cholesterol levels. The high vitamin C content in chives has been proposed to help prevent colds. They can also speed recovery if a cold develops by helping the body to expel mucus; the sulfurous compounds in chives are natural expectorants. The medicinal properties of chives are as varied as their uses in the kitchen. Chives may stimulate appetite and promote good digestion (Ellingsworth, 2024). Chives have been used traditionally as a medicinal herb. The Romans believed chives could relieve the pain from sunburn or a sore throat. It further was believed that bunches of dried chives hung around a house would ward off disease and evil. Just as the growing plant repels unwanted insect life, the juice of the leaves can be used for its insect repellent properties, as well as fighting fungal infections, mildew, and scab. The medical properties of chives are similar to those of garlic, but weaker; the faint effects in comparison with garlic are probably the main reason for its limited use as a medicinal herb. Containing numerous organosulphide compounds such as allyl sulfides and alkyl sulfoxides, chives have a beneficial effect on the circulatory system, acting upon it by lowering the blood pressure. As chives are usually served in small amounts and never as the main dish, negative effects are rarely encountered, although digestive problems may occur following over-consumption (Plantgrower, 2024). The medical properties of chives are similar to those of garlic, but weaker; the faint effects in comparison with garlic are probably the main reason for its limited use as a medicinal herb. Containing numerous organosulphide compounds such as allyl sulfides and alkyl sulfoxides, chives have a beneficial effect on the circulatory system, acting upon it by lowering the blood pressure. As chives are usually served in small amounts and never as the main dish, negative effects are rarely encountered, although digestive problems may occur following over-consumption. Chives are also rich in vitamins A and C, and contain trace amounts of sulfur and iron (Chemeurope, 2024). Contain mild antibiotics and some iron. A source of Vitamin C. Can stimulate your appetite. Can improve your digestion and help with intestinal problems. Can be used as a mild laxative. Homeopaths use to treat colds and bronchitis (Victoria, 2024). Chives contain multiple vitamins and minerals including: Vitamin K, A and C, calcium, iron, magnesium, phosphorus, potassium, and sodium. Chives are known to be a mild anti-inflammatory. They have some antibiotic properties, like the other plants in the allium group (onions, garlic, *et al*). Scientific research shows that chives may stimulate the body's digestion of fat. Eaten regularly, chives may help lower blood cholesterol levels. The high vitamin C content in chives has been proposed to help prevent colds. They can also speed recovery if a cold develops by helping the body to expel mucus; the sulfurous compounds in chives are natural expectorants. The medicinal properties of chives are as varied as their uses in the kitchen. Chives may stimulate appetite and promote good digestion (Ellingsworth, 2024).

CULTIVATION

Germination and Propagation: Chive seeds need soil temperatures to be somewhere between 60 and 70°F. Much hotter or colder, and they will either stay dormant or they'll die off. Sow seeds approximately ¼" deep; germination takes about 7-14 days (65–70°F). Seeds are best stored in the refrigerator and can be purchased directly from us via our Seed Store. One can also use the method of "division", often called "divide and propagate" to multiply your chives. Once a clump of chives have sprouted and grown a little in a small pot removes the root ball from the container. Use a bucket half filled with water to perpetually dunk the root ball until you can get the sprouts to separate from one another (Hawaii, 2024).

Growing chives from seed: Growing chives from seed is a very easy process. You can start them indoors or directly sow them outdoors. Choose a well-drained location with fertile soil. Loosen the soil to a depth of about 15-20 cm and remove any weeds or debris. Sprinkle the chive seeds evenly over the prepared soil surface. Aim to space the seeds about 6-12 mm apart. You can sow the seeds in rows or broadcast them across the area. Lightly cover the seeds with a thin layer of soil, about 6 mm deep. Gently pat down the soil to ensure good seed-to-soil contact. Water the area thoroughly to moisten the soil. Keep the soil consistently moist but not waterlogged during the germination period, which typically takes 7-14 days. Water the area regularly, especially during dry spells, to support seed germination and early seedling growth. Once the chive seedlings have developed a few sets of true leaves, thin them to provide adequate spacing. Space the seedlings about 15-20 cm apart to allow room for growth. Applying a layer of organic mulch around the chive plants can help conserve moisture, suppress weeds, and regulate soil temperature. Use straw, shredded leaves, or compost, and apply it evenly around the plants, leaving a small gap around the stems to prevent rot. As the chive seedlings grow, continue to provide them with adequate light, water, and nutrients. Fertilize with a diluted liquid fertilizer every few weeks to promote healthy growth. Throughout the growing season, keep an eye on your chive plants and provide regular care as needed. Remove any weeds that compete with the chives for nutrients and water, and water the plants during dry spells to prevent drought stress (Azure Farm. 2025).

Growing chives from bulbs: Growing chives from bulbs from another plant is also very easy and shortens the growing process, giving you yummy herbs earlier! Here's a step-by-step guide on how to grow chives from bulbs: Choose high-quality chive bulbs that are firm and free from mold or damage or a start that is bright green, full, and at least 7.6–12.7 cm in height. Before planting, prepare the soil by loosening it to a depth of about 15-20 cm and incorporating organic matter such as compost or aged manure to improve soil fertility and drainage. Moisten the soil. Plant chive bulbs in the prepared soil, spacing them about 15-20 cm apart. Dig a hole slightly larger than the bulb and place it in the hole with the pointed end facing upward. Cover the bulbs with soil and gently firm the soil around them. After planting, water the bulbs thoroughly to settle the soil and provide moisture for root development. Keep the soil consistently moist but not waterlogged during the growing season, especially during hot, dry weather. Chives are not heavy feeders, but you can fertilize them with a balanced fertilizer or compost tea in early spring to promote healthy growth. Avoid over-fertilizing, as this can lead to excessive foliage growth at the expense of flavor. Applying a layer of organic mulch around the chive plants can help conserve moisture, suppress weeds, and regulate soil temperature. Use straw,

shredded leaves, or compost, and apply it evenly around the plants, leaving a small gap around the stems to prevent rot. Throughout the growing season, keep an eye on your chive plants and provide regular care as needed. Remove any weeds that compete with the chives for nutrients and water, and water the plants during dry spells to prevent drought stress (Azure Farm, 2025).

Cultivation

To ensure successful chive cultivation, certain conditions need to be met. Here are the key factors to consider:

Climate and Temperature: Chives thrive in temperate climates with cool summers and mild winters. The ideal temperature range for chive growth is between 15-24°C (59-75°F). They can tolerate light frosts but may need protection during harsh winters (Dripro, 2024).

Soil Requirements: Chives prefer well-drained soil with a pH level between 6.0 and 7.0. The soil should be rich in organic matter and have good water-holding capacity. Amending the soil with compost or well-rotted manure before planting can improve its fertility (Dripro, 2024).

Sunlight: Chives require full sun exposure for at least six hours a day. Adequate sunlight promotes healthy growth and enhances the flavor of the leaves (Dripro, 2024).

Watering: Chives have moderate water requirements. While they can tolerate short periods of drought, consistent and sufficient watering is essential for optimal growth and yield. Proper irrigation methods play a crucial role in ensuring water efficiency and the overall health of the plants (Dripro, 2024).

Efficient Irrigation Methods for Chives: To irrigate chives efficiently, it is important to consider water conservation and sustainable practices. Here are some modern irrigation methods that can be employed:

Drip Irrigation: Drip irrigation is a highly efficient method that delivers water directly to the root zone of plants. It minimizes water wastage by reducing evaporation and runoff. Drip systems consist of tubes or pipes with emitters that release water slowly and evenly. This method ensures that chives receive a consistent water supply while reducing water usage (Dripro, 2024).

Sprinkler Irrigation: Sprinkler irrigation involves the use of overhead sprinklers that distribute water over the entire field. This method is suitable for larger chive plantations. However, it is important to choose sprinklers that provide uniform coverage and minimize water loss due to wind drift or evaporation (Dripro, 2024).

Smart Irrigation Controllers: Smart irrigation controllers utilize advanced technology to optimize water usage. These controllers monitor weather conditions, soil moisture levels and plant water requirements to determine the precise amount of water needed. By adjusting irrigation schedules accordingly, smart controllers help conserve water and prevent overwatering (Dripro, 2024).

Mulching: Applying a layer of organic mulch around chive plants can help conserve soil moisture. Mulch reduces evaporation, suppresses weed growth and regulates soil temperature. Organic materials such as straw, wood chips, or compost can be used as mulch (Dripro, 2024).

Growing: Chives are easy to grow. Since they are perennials, they grow back each spring, and are one of the first things we can eat each year. Chives grow well outside anywhere in your landscaping or thrive indoors on a sunny windowsill. Every three or four years, divide the bulbs, so that they keep proliferating (Ellingsworth, 2024).

Selection: Look for slender green chives with a uniform green color and no signs of wilting or browning (Ellingsworth, 2024).

Storage: Chives are most flavorful when used fresh. However chives can be stored. Chives can be stored cut up or in bunches in plastic in the refrigerator for up to a week. Chives can be frozen to be stored longer by chopping up prewashed leaves into small pieces and freezing them in plastic containers. It is not necessary to thaw pieces out before using. Chives can also be dried in a dehydrator. Dried chives may be placed in small jars and stored. In this form they can be used anywhere you might ordinarily use dried onions (Ellingsworth, 2024).

Preparation: The entire chive may be eaten, from the flower, to the leaves, and down to the bulb. Perhaps the most popular use for the chive is to cut the leaves into 1/4-inch pieces to sprinkle on top of a baked potato, providing a crunchy, light, oniony addition to a sour cream topping. Chives are also commonly used in soups and dips. An unusual and colorful twist is to use the flower as an exciting garnish for a soup, or broken up it can be spread over a salad. Chives can be used in many places where onions might also enter. Try putting them in a stuffing recipe, or adding to most soups. They are very versatile, great fresh or dried. Generally, put them in late during cooking to preserve their crispness or snipped and sprinkled on food just before serving for seasoning (Ellingsworth, 2024).

Vegetative: Chives can be propagated by division. Every 2–3 years, separate large clumps into groups of about 5 bulbs, and replant at 6–10" apart (Phytotheca, 2025).

Climate: Chives grow best in cool weather. They will survive heat if given sufficient moisture but will produce more flowers and less leaves. These plants can tolerate light frost but will die back in cold winters (Phytotheca, 2025).

Light- Natural: Prefers full sun or partial shade (Phytotheca, 2025).

Light-Artificial: Will grow indoors in a sunny window. Provide additional lighting if needed (Phytotheca, 2025).

Soil: Prefers well-drained, loamy soils but are adaptable and will grow in poorer soils. A pH of 6.5–7.0 will keep plants healthy and nourished (Phytotheca, 2025).

Soiless: Grows in most soilless media including rockwool, soilless mixes, perlite, vermiculite, and coco coir (Phytotheca, 2025).

Hydroponics: Thrives in hydroponic systems. Use growing media with good water holding capacity (Phytotheca, 2025).

Aeroponics: Thrives in aeroponic systems (Phytotheca, 2025).

Water: Requires moderate to high levels of water. Soil should be kept moist but take care not to overwater. Plants will need more water in hot or dry weather (Phytotheca, 2025).

Nutrients: Requires low to moderate levels of nutrients. Sidedress with compost or well-balanced fertilizer once per year (Phytotheca, 2025).

Pruning: Divide every 2–3 years. If you don't want your chives to reseed, pick off flowers before they mature (Phytotheca, 2025).

Mulching: Use mulch to keep weeds under control, moderate soil temperature, and conserve moisture (Phytotheca, 2025).

Rotation: Because it's a perennial, chives will grow in the same garden area for many years (Phytotheca, 2025).

Companions: Will grow well with carrots, beets, celery, grapes, roses, tomatoes, cress, mint, parsley, cabbage, eggplant, strawberries, rhubarb, kohlrabi, mustard, and squash. Avoid beans, peas, asparagus, and spinach (Phytotheca, 2025).

Chives prefer cooler temperatures and thrive when planted in early spring or late summer. Aim to plant them when the soil temperature reaches around 15°C or around 6 to 8 weeks before your last spring frost date. If you're planting in the fall, make sure to do so at least a few weeks before the first frost to give the plants time to establish themselves. Chives are a perennial herb that grows back every year, growing from little bulbs beneath the soil. Over time, the bulbs split and develop new ones, resulting in a larger cluster of chives. The plant's foliage dies back each fall, and the bulbs beneath the soil become dormant. When warmer weather approaches in spring, the bulbs begin to sprout new green, spiky leaves (Azure Farm, 2025). Chives may be grown from seed sown early indoors and transplanted outside after frost or sown directly in the garden. Direct sow in average soil in full sun after all danger of frost. In frost free areas sow from fall to early spring. Remove weeds and work organic matter into the top 6-8 inches of soil; then level and smooth. Sow seeds evenly and cover with ¼ inches of fine soil. Firm the soil lightly and keep evenly moist. Seedlings will emerge in 7-14 days. Thin to 3 inches apart when seedlings are 1-2 inches tall (Burpee, 2024). Keep weeds under control during the growing season. Weeds compete with plants for water, space and nutrients, so control them by either cultivating often or use a mulch to prevent their seeds from germinating. Mulches also help retain soil moisture and maintain even soil temperatures. For herbs, an organic mulch of aged bark or shredded leaves lends a natural look to the bed and will improve the soil as it breaks down in time. Always keep mulches off a plant's stems to prevent possible rot. Keep plants well-watered during the growing season, especially during dry spells. Plants need about 1 inch of rain per week during the growing season. It's best to water with a drip or trickle system that delivers water at low pressure at the soil level. If you water with overhead sprinklers, water early in the day so the foliage has time to dry off before evening, to minimize disease problems. Keep the soil moist but not saturated. Cut leaves to the ground after blooming to encourage the production of fresh new leaves. For garlic chives, pinch off spent flowers in fall to prevent rampant self-sowing. Divide clumps every 3 to 4 years to keep them vigorous. Monitor for pests and diseases. Check with your local Cooperative Extension Service for pest controls recommended for your area (Burpee, 2024).

Chives are cultivated both for its culinary uses as well as its ornamental value; the violet flowers are often used in ornamental dry bouquets. Chives thrive in well drained soil, rich in organic matter, with a pH of 6-7 and full sun. Chives can be grown from seed and mature in summer, or early the following spring. Typically, chives need to be germinated at a temperature of 15 °C to 20 °C and kept moist. They can also be planted under a cloche or germinated indoors in cooler climates, then planted out later. After at least four weeks, the young shoots should be ready to be planted out. Some prefer to replant the small clumps of chives available in plastic pots at some markets, thus avoiding unnecessary work with sowing seeds and cloche cultivation. In the winter, chives die back to the underground bulbs, with the new leaves appearing in early spring. Chives starting to look old can be cut back to about 2-5 cm; this length is also preferred when harvesting, making the unattractive yellowing appear close to the ground, so that the plant can retain its aesthetic value (Chemeurope, 2024). Chives prefer a full sun location and are tolerant of a wide variety of soils but will grow best in soils that are high in organic matter. Chives are most commonly propagated by dividing the clumps in early spring. Clumps should contain about 4-6 bulbs. They can also be grown from seed sown in spring. Seed may be slow to germinate and take 4-6 weeks to produce transplants. Plants grown from seed will produce variations in leaf texture and size. To keep plantings vigorous and from becoming overcrowded, divide plants every 2-3 years. Plants that are harvested frequently benefit from supplemental fertilizer during the season. Chives can self-sow and overtake a garden unless flowers are removed before they fade. Chives also make attractive edging in the perennial border and flowers can be cut for arrangements (IE, 2024).

The Chive will grow in any ordinary garden soil. It can be raised by seed, but is usually propagated by dividing the clumps in spring or autumn. In dividing the clumps, leave about six little bulbs together in a tiny clump, which will spread to a fine clump in the course of a year, and may then be divided. Set the clumps from 9 inches to a foot apart each way. For a *quick return*, propagation by division of the bulb clumps is always to be preferred. The green from the clumps can be cut three or four times in the season. When required for use, each clump may be cut in turn, fairly close to the ground. The leaves will soon grow again and be found more tender each time of cutting. By carefully cropping, the 'grass' can be obtained quite late in the season, until the early frosts come, when it withers up and disappears through the winter, pushing up again in the first warm days of February. For early crops, a little 'grass' can be forced on the clumps by placing cloches or a 'light' over them. Beyond weeding between the clumps, no further care or attention is needed after division. Beds should be re-planted at least once in three or four years. If it is desired to produce seed, grow two plantations, one for producing 'grass' for use, and the other to be left to flower and set seed, as you cannot get the two crops - 'grass' and seed, off the one set of plants (Grieve, 2024). Chives have been cultivated in Europe since the Middle Ages (from the fifth until the 15th centuries), although their usage dates back 5,000 years. Chives are cultivated both for their culinary uses and for their ornamental value; the violet flowers are often used in ornamental dry bouquets. Chives thrive in well-drained soil, rich in organic matter, with a pH of 6–7 and full sun. They can be grown from seed and mature in summer, or early the following spring. Typically, chives need to be germinated at a temperature of 15 to 20 °C (59 to 68 °F) and kept moist. They can also be planted under a cloche or germinated indoors in cooler climates, then planted out later. After at least four weeks, the young shoots should be ready to be planted out. They are also easily propagated by division. In cold regions, chives die back to the underground bulbs in winter, with the new leaves appearing in early spring. Chives starting to look old can be cut back to about 2–5 cm. When harvesting, the needed number of stalks should be cut to the base. During the growing season, the plant continually regrows leaves, allowing for a continuous harvest. Chives are susceptible to damage by leek moth larvae, which bore into the leaves or bulbs of the plant (Inaturalist, 2024).

Chives are very adaptive to different environments. Tolerant of cold temperature, chives can germinate slowly when daily temperature averages 3–5 °C, while its most suitable temperature ranges from 15–20 °C. Because of its shallow root system, care must be taken to maintain soil moisture, especially to prevent flooding. Chives grow best in well-drained, fertile soil with medium acidity. Optimum growing temperatures are between 17–25 °C, cold hardy, and tolerant of high temperatures, and so can be grown widely distributed throughout the world. The plants will start to flower after staying dormant for a period in cold temperatures (Chen, 2012c). Chives grow all year around and can be cultivated and harvested in batches throughout the four seasons. Propagation is usually with seed or division. For mass production, seeding in spring or autumn is suitable. Seedlings can be planted once 15 cm high. Each 20 cm × 10 cm pocket can accommodate 4–6 seedlings. They can be harvested in about two months when the plant reaches 30 to 50 cm in height. The first harvest will produce a relatively low yield. Chives can be harvested about once each month, and more frequently after the second harvest, to about 5–7 times per year in warm areas, and 2–4 times per year in colder climates. In cold areas, each harvest will yield more, to about 15 ton/ha. When processing, do not cut to the sheath (4 cm above ground). On average, reseeding or dividing the clumps every four years will keep the productivity high. In some areas, harvesting is done by plucking the plants by the roots rather than cutting (Chen, 2012c). Select well drained, fertile sandy or clay soil; maintain the cleanliness of the field and weed promptly; use high quality organic compost with appropriate N.P.K. ratios. The crop is susceptible to many root diseases. Rotations are a key aspect for a sustainable agricultural production system, a rotation of at least five years is recommended. Although chives can be grown in all kinds of soils, the most suitable soils are sandy loams to loams with a fair content of organic matter and good soil structure. Soil pH of 6–6.5 is considered sufficient. Chives demand a high nutrient level. In the years following planting, the annual uptakes in yield are 185–200 kg/ha for nitrogen, 17–20 kg/ha for phosphorus, and 120–140 kg/ha for potassium in the most intensively fertilized treatment producing the highest yield. Black plastic mulch is effective in increasing yield, controlling weeds and maintaining soil moisture. Selected productive cultivars or populations produced 10–20% higher yields than the less productive cultivars. The results show that chive is feasible for commercial production with improving cultivation techniques (Chen, 2012c). Chives and related *Allium* crops are subject to a variety of diseases and attack by arthropod pests that can reduce crop yield and quality. Integrated pest management (IPM) is a sustainable approach to managing diseases and arthropod pests. IPM promotes the use of a variety of strategies and tactics, including pest-resistant varieties and biological, cultural and chemical controls, in a way that reduces costs, conserves natural resources and minimizes health and environmental risks. Decision-making is a key component of IPM programs. So far, monitoring programs forecasting systems for diseases (*Botrytis* leaf-blight, downy-mildew and purple-blotch) and pests (onion maggot, onion thrips, leek moth, cutworms, beet armyworm, aster leafhopper, aphids and mites) have been set up. IPM will continue to be the preferred strategy as it takes a whole-system approach as environmental problems take on greater importance. Since chives compete poorly with weeds, the use of herbicides is widespread and the economic advantages of their use have been demonstrated. Scientific studies are starting to appear on the effects of organic production methods of weed control (Chen, 2012c).

Choose a planting site in sun or light shade with fertile, moisture-retentive, well-drained soil. Chives take up little space, so only need about 15–30cm per plant, depending on the size of the clump you will be planting. Weed the ground thoroughly before planting and add garden compost. Can refer to either home-made garden compost or seed/potting compost: Garden compost is a soil improver made from decomposed plant waste, usually in a compost bin or heap. It is added to soil to improve its fertility, structure and water-holding capacity. Seed or potting composts are used for growing seedlings or plants in containers - a wide range of commercially produced peat-free composts are available, made from a mix of various ingredients, such as loam, composted bark, coir and sand, although you can mix your own. Also known as clay soil. It is dense and slightly sticky, made of fine clay particles, and can be heavy and difficult to dig. It often drains poorly after rain and warms up slowly in spring, but is usually heavy soil to improve drainage. Chives can also be grown in large containers (30cm in wide or more) of soil-based compost in a warm, sunny or lightly shaded position (RHS, 2024). Chives can be grown from seed in spring, but it's much easier to just buy young plants in spring and summer. These are cheap and easy to plant, and should settle in quickly. Sow seeds in

spring into prepared ground (see above) or large containers filled with multi-purpose compost (RHS, 2024). The quickest and easiest way to get chives started in your garden is to buy potted plants from garden centres, online plant suppliers or supermarkets. They can be planted outside from spring onwards. Large plants can often be pulled apart into several smaller clumps for planting out. You can also transplant young seed-raised plants outdoors once they're about 10cm tall. Take care to acclimatise them to outdoor conditions first by hardening off for a couple of weeks. Space clumps of chives at least 15cm apart. They can be planted into prepared soil (see above) or containers that are at least 30cm wide. Chives fit well into a mix herb display and look great as an edible edging to borders. Make sure they're in a handy spot near the kitchen, so you can pick them easily whenever needed (RHS, 2024).

Plant Care: Chives are incredibly easy to maintain. Simply harvest leaves regularly to encourage more, water in dry spells and snip off faded leaves and spent flowers (RHS, 2024).

Watering: Water newly planted chives and young plants regularly for at least their first summer. For plenty of lush, succulent leaves, make sure chives don't go short of water in warm, dry weather. Plants in containers can dry out quickly, so water them regularly throughout the growing season (RHS, 2024).

Mulching: Lay a thick layer of mulch, such as garden compost, around clumps of chives to help hold moisture in the soil and stop it drying out in hot weather (RHS, 2024).

Weeding: Weed thoroughly before sowing or planting chives, then keep the area free of weeds on an ongoing basis, so chives don't have to compete for water or light. Dense weeds can also reduce air circulation, which can allow fungal diseases such as leek rust to spread (RHS, 2024).

Propagating: You can easily make new plants from an established clump of chives by dividing it into several smaller clumps in spring. Replant these straight away (see Planting, above). This should be done every few years to stop clumps getting overcrowded and keep them healthy and growing strongly. With plants in containers, either move large clumps into a slightly bigger pot every few years or divide in a similar way to plants in the ground (RHS, 2024).

Flowering: Chives produce small pinky-mauve pompom flowerheads in late spring and summer, which look decorative and are edible too. The nectar-rich flowers are also great for pollinating insects, especially bees. After flowering, to keep chives looking neat, remove the faded heads, cutting and removing the tough, inedible flower stalks right at the base. Alternatively, once the flowers fade, cut the whole clump down to 5cm from the base, to stimulate a fresh new flush of young, tasty foliage that you can start picking in a few weeks. Flowering hinders new leaf production, so if harvesting the leaves is your priority, then you can remove all the flower. A bud is a small, undeveloped shoot that contains the potential for new growth. Buds are typically found on stems, where they can be apical (found at the tip) or axillary (found between leaf axils) and may develop into leaves, shoots or flowers buds to prevent flowering (RHS, 2024).

You can harvest chives outdoors from late spring until they start to die back in autumn. To extend the harvesting period, pot up chive plants and bring indoors over winter, placing them on a warm sunny windowsill. To harvest the mild, onion-flavoured leaves, simply snip with scissors just above the base whenever required. Remove any faded leaves at the same time. Harvest in the morning if possible, when the leaves are lush and juicy. In hot weather, put the leaves straight into water or a plastic bag, to keep them from wilting. The more often chives are harvested, the more new leaves they will produce. You can also harvest the edible mauve flowerheads, which appear in late spring and summer. Pick when young, removing the stiff, inedible stems at the base too. Then scatter the tiny individual flowers into salads and other dishes, for extra colour and a mild onion flavour. Use chive leaves raw, as they lose their flavour if cooked. Simply chop the leaves finely and scatter generously over all kinds of cold or cooked dishes, from salads, potato salads and cream cheese to omelettes, soups and pastas. Chives are best used freshly picked, or you can stand them in a glass of water to keep them at their best for a day or so. They can also be kept in a plastic bag in the fridge for a few days. The leaves can be frozen too – chop them finely, pack into an ice-cube tray and top up with water, then freeze. Defrost and use whenever needed, although they will have less flavour than fresh leaves (RHS, 2024).

Harvesting

Harvesting: Chive plants flower in May or June - the flowers are tasty in salads. The stems are great in omelettes, potatoes, soups, etc. During the growing season, the plant will continually regrow leaves, allowing for a continuous harvest. Gardening enthusiasts appreciate the purple blossoms because they enhance pollination throughout a garden because they attract bees, while the compounds in the stems repel several species of garden pests, including Japanese beetles. **Chives** in the garden can also reduce the incidence of fungal diseases and mildew (Ellingsworth, 2024).

Harvesting Spikes: Thankfully, chives have a long harvest period. Their tiny green spikes pop out of the soil in early spring. Harvests begin as soon as those early leaves are 3 to 4 inches long. If the plant is treated properly throughout the growing season, the chive harvest continues. You'll be able to pick until the leaves succumb to fall's first frost. Yes, that means if you play your cards right, you'll have up to 8 months of chive harvests! Gardeners in warm climates that don't receive killing frosts can even harvest chives year-round. This young chive plant is ready for its first harvest. This is the early spring growth, before the flower buds have developed (Walliser, 2024).

Harvesting flowers: One of the most fun things about chives is that the entire plant is edible. So, while your focus might be on how to harvest chives for their leaves, don't forget to harvest the flowers, too. The edible blossoms of the chive plant are a beautiful pale-purple, and they taste like a mild chive. Chive flowers make great additions to soups, salads, and can even be used to flavor homemade hummus or salsa. To harvest chive flowers, pop the flower head off its stem using your thumbnail and the pad of your index finger or an herb snip. Intact flower heads can be stored in a plastic bag in the fridge for several days. When you're ready to enjoy them, simply snap the individual florets off the larger flower head and sprinkle them into your recipe (Walliser, 2024).

Harvesting bulbs: Remember when I said the entire chive plant is edible? Well, that means the small underground bulbs are edible, too. However, if you harvest all of them, the plant won't return. If you're looking for some intense chive flavor, you can use a soil knife or narrow trowel to sneak out a few bulbs from time to time and cook them with scrambled eggs or use them in place of onions in other recipes. They're not a personal favorite of mine and they're pretty small, but maybe you'll find them to your liking. As you can see, learning how to harvest chives results in repeated harvests of this delicious perennial herb. Plant multiple chive plants so you'll always have plenty on-hand. They make great partners for another perennial herb that's easy to grow and harvest (Walliser, 2024).

Cooking: Chives are delicate and tender and are best eaten raw or cooked very briefly. Overcooking wilts and weakens their texture and flavor. They can be chopped or blended into small bits, which releases their oniony flavor. They also work well as a garnish (think: a topping for a baked potato and sour cream or deviled eggs). But they also make great additions to salad dressings and dips. Chives don't last long in the refrigerator after you bring them home from the grocery store. It's best to use them within a day or two after you buy them (Google, 2024a). If the flavor differences between the two chives (onion versus garlic) feel subtle, the way they work in the kitchen won't. European chives work like an herb, and its delicate flavor comes through best when it's added to dishes raw just before serving. They make companions to all kinds of dairy — butter, cream cheese, ricotta and sour cream, to name a few. Instead of an intense slice of red onion on your next bagel and cream cheese, consider a handful of chive ringlets (which will play nicely with smoked fish as well). Chive oil and vinaigrettes are excellent. Dress up those deviled eggs, or your next omelet, and don't forget chive-ing up your favorite potato salad. Try making this chive pesto. Along with chervil, parsley and tarragon, chives are a classic component of *fines herbes*, a French herb mixture, finely chopped, and used just before using (Foodprint, 2024).

Consumption

Preserve: Can be added to pickle recipes for flavoring. You can also make chive vinegar by adding fresh, washed, and chopped chives to vinegar and leaving the mixture to sit, stirring every few days. Strain out the leaves before use (Phytotheca, 2025).

Prepare: Use fresh, chopped chives as a garnish and flavoring for your favorite dishes. Commonly used in soups, salads, potato dishes, and sandwiches. Use as a substitute for scallions (Phytotheca, 2025).

Storage: Chive leaves can be frozen or dried for later use. Store dried leaves in a cool place in an airtight container (Phytotheca, 2025).

Preserving: You can preserve the harvest by freezing chives a few different ways (Foodprint, 2024): Chop and flash freeze on a baking tray so they don't clump. Place a teaspoon of chopped chives into ice cube trays then fill each with water and freeze. Bunch whole chive blades and roll into a log, tightly wrap in plastic and bind with a rubber band. Remove from the freezer and snip as needed.

Post harvest: Because chives are used as a vegetable or for seasoning, it is important to preserve the fresh green appearance as well as the unique aroma. After harvest, remove withered and damaged leaves. Immediately store in temperatures as low as 0 °C (32 °F), but not lower in order to prevent freezing. At 0 °C, with humidity of 95–100%, chives can be kept fresh for one to two weeks. The respiration rate of chives increases with temperature. At 0 °C, $\text{mg CO}_2 \text{ kg}^{-1} \text{ h}^{-1}$ is 22, which increases to 110 at 10 °C, and 540 at 20 °C. In fact, when the temperature rises above 10 °C, chives will wilt quickly. When transporting, chives are usually packed into 1–3 kg packets, also in bunches of 10–50 g and kept moist in wax cartons at around 2–6 °C. Pre-cooling is recommended. In an experiment, green tops were bunched, 25–30 g per bunch, packed in perforated or non-polythene bags (20 cm × 25 cm) and stored at 2, 5, 10, 15 or 20 °C. The control was kept unpacked.

The tops stored better in non-perforated than in perforated bags and the longest satisfactory storage of 14–21 days was in non-perforated bags at 2 °C, but deteriorated rapidly at the higher temperatures (Chen, 2012c). Studies have been conducted on freshly harvested chives under simulated conditions of air transport from Israel to Europe, and also with an actual shipment, during which temperatures fluctuated between 4 and 15 °C. Packaging in sealed polyethylene-lined cartons resulted in a marked retardation of both yellowing and decay. However, sealed film packaging was applicable only if the temperature during transit and storage was well controlled, otherwise perforated polyethylene was better. Chives can be used as seasoning for many dishes, or as garnish. Chives especially enhance the flavour of fish. There is a very delicious Chinese dish known simply as fish with chives. Chives can be included in many food items such as pancakes, buns, dumplings, and cookies. It can also be used in many dairy and meat products (Chen, 2012c).

Diseases

Botrytis Blight: This causes the older leaves and the center of the plant to rot. It can start with a yellowish brown irregular spots on the leaves or water soaked spots on the stems. The fungus turns a fuzzy gray and emits a cloud of spores when touched (Burpee, 2024).

Damping Off: This is one of the most common problems when starting plants from seed. The seedling emerges and appears healthy; then it suddenly wilts and dies for no obvious reason. Damping off is caused by a fungus that is active when there is abundant moisture and soils and air temperatures are above 68 degrees F. Typically, this indicates that the soil is too wet or contains high amounts of nitrogen fertilizer (Burpee, 2024).

Downy Mildew: Pale spots appear on the leaves with a gray-purple fuzzy growth. The leaves turn pale green then yellow and the tips collapse (Burpee, 2024).

Pink Root Rot: A fungus that attacks roots causing them to turn a light pink, then red and eventually purple-brown and causing them to shrivel. Infected plants show signs of nutrient deficiencies and drought because the roots cannot take up water and nutrients. Plants are stunted. The disease lives in the soil for several years and thrives in warm temperatures (Burpee, 2024).

Powdery mildew: This is a fungus disease causes a white powdery look on the foliage. This disease weakens plants as it inhibits their ability to make carbohydrates for themselves using sunlight (Burpee, 2024).

Leek rust: Leek rust is a common fungal disease of leeks and garlic, but also affects onions and chives. The fungus causes bright orange, raised spots (pustules) on leaves (Fig. 4) (RHS, 2024).

Pests

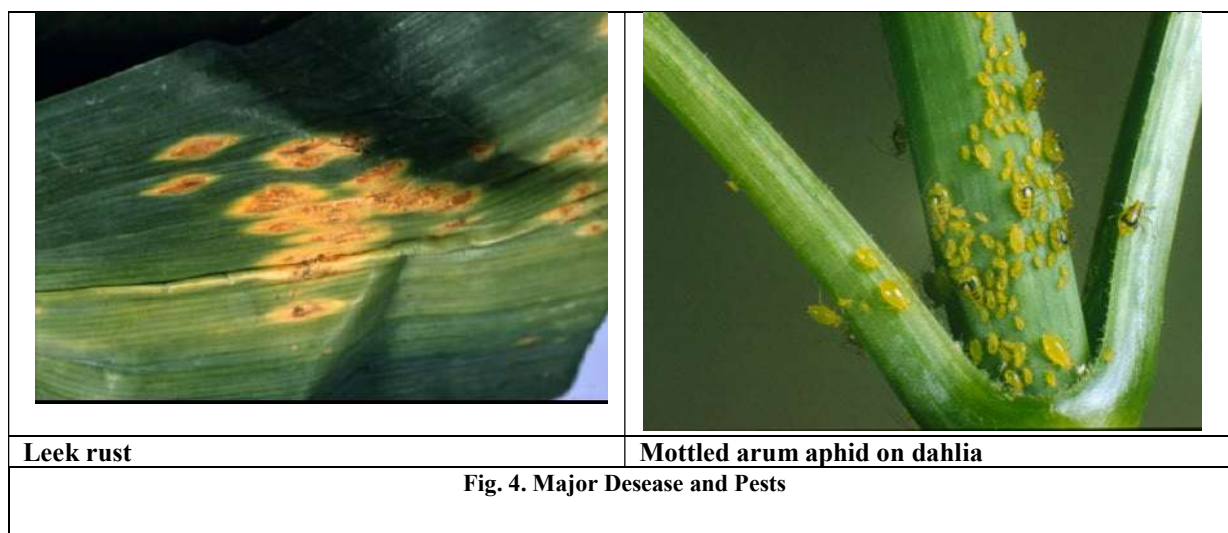
Aphids: Greenish, red, black or peach colored sucking insects can spread disease as they feed on the undersides of leaves. They leave a sticky residue on foliage that attracts ants (Burpee, 2024). Aphids are sap-sucking insects, they have many predators and are the basis for many food chains. The sap sucking can cause a lack of plant vigour, distorted growth and often excrete a sticky substance (honeydew) on which sooty moulds can grow. Some aphids transmit plant viruses (RHS, 2024).

Mealy bugs: Mealy bugs are 1/8 to 1/4 inch long flat wingless insects that secrete a white powder that forms a waxy shell that protects them. They form cottony looking masses on stems, branches and leaves. They suck the juices from leaves and stems and cause weak growth. They also attract ants with the honeydew they excrete, and the honeydew can grow a black sooty mold on it as well (Burpee, 2024).

Onion Maggot: This insect causes stunted or wilted seedlings and damaged roots and bulbs. The adult is a greyish colored fly which lays its eggs around the base of the plant. The maggots bore into the roots (Burpee, 2024).

Spider mites: These tiny spider-like pests are about the size of a grain of pepper. They may be red, black, brown or yellow. They suck on the plant juices removing chlorophyll and injecting toxins which cause white dots on the foliage. There is often webbing visible on the plant. They cause the foliage to turn yellow and become dry and stippled. They multiply quickly and thrive in dry conditions (Burpee, 2024).

Thrips: Thrips are tiny needle-thin insects that are black or straw colored. They suck the juices of plants and attack flower petals, leaves and stems. The plant will have a stippling, discolored flecking or silvery of the leaf surface. Thrips can spread many diseases from plant to plant (Fig. 4) (Burpee, 2024).



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