

General Sowing and Cultivation Information

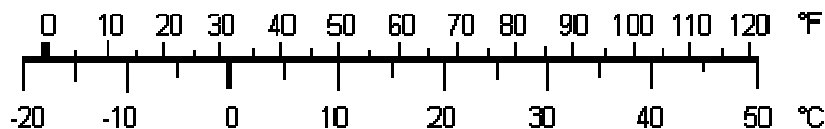
The following sowing and cultivation information are based upon our own experiences and/or had been retrieved from botanical institutions/plant organizations and/or e-mail discussion lists. Please keep in mind that under different conditions in your cultivation (such as elevation, average rain fall per year, soil, etc.) some plants may require deviant conditions concerning soil, moisture and light, and may prove hardier whilst others are a little bit more tender. With a growing experience you will be able to grow even very demanding plants as well!

I. Relative Hardiness (USDA Climate Zones)

Probably one of the most important factors for successfully growing plants is to know each species' **relative hardiness**. Many plants from subtropical zones show a significant **frost resistance**, i.e. they may survive without any major damages temperatures below freezing for a **short time**. Despite this relative frost tolerance, many of these plants cannot be regarded as winter hardy, as permanent low temperatures and strong frost periods will inevitably result in a complete loss. On grounds of a very broad variation of climatic zones from which plants descend of (Minor and Central Asia, Australia, Japan, North America, Central America, South America, New Zealand, Siberia and South Africa), and in order to more easily compare plants' requirements, their frost resistance is given in **USDA Climate Zones** (*United States Department of Agriculture Zones*) in the webshop.

A plant may be regarded as **sufficiently winter hardy**, if it will survive in the open garden in an average winter without any special winter protection. In order to make it easier for you to choose plants which suit **your specific region**, please note your local USDA Climate Zone as given in the conversion table below. **For Central Europe** as well as **the northern states of the US** and **southern Canada** all plants from a **USDA Climate Zone 6 to 7** shall be hardy enough to be planted into your garden without any additional winter protection. In regions with especially **mild climates**, most species from **USDA Climate Zone 8** will survive average winters. In order to prevent or to minimize any frost damages, it is recommendable to protect especially younger plants with some mulch layer or any similar dry and insulating material in these areas during winter. USDA Climate Zones 9 and 10 are typical for the Mediterranean region, southwestern France, Atlantic coast of Portugal, Ireland and southern England in Europe and California or Florida in the US. At least plants of **USDA Climate Zone 9** may be successfully cultivated in colder areas under **cold glass** (i.e. in an unheated greenhouse or wintergarden), as long temperatures are not likely to drop to far below freezing during nights.

Fahrenheit-Celsius Conversion Scale



In order to find **your local climatic conditions**, please have a look at the **conversion table** below:



Zone 6: -10°F to 0°F or -23°C to -18°C

Zone 7: 0°F to 10°F or -18°C to -12°C

Zone 8: 10°F to 20°F or -12°C to -7°C

Zone 9: 20°F to 30°F or -7°C to -1°C

Zone 10: 30°F to 40°F or -1°C to 4°C

Zone 11: above 40°F or above 4°C

If for example a plant is described as **USDA Climate Zone 6**, this means that the plant can probably tolerate temperatures **for a longer period** down to about **-23°C / 10°F** without showing any major damages.

For all species which are knowably not hardy (i.e. those which require temperatures higher than those you would expect in zone 11) or are of doubtful hardiness the USDA Climate Zone will be omitted in the web shop. If these species are exposed to even slight frosts, severe damages might occur. They should be cultivated under frost free conditions throughout the year.

II. Soil

Overall good germination results can be achieved by using **a single soil mixture for most genera and species** offered here. This all-purpose soil is made up of:

1 part grit sand or crushed (black or red) lava
1 part loamy soil
1 part humus rich soil (e.g. mature garden compost, rotten pine-needles or pure peat)

You may want to adjust this standard potting medium for certain genera and species by an:

increase in the amount of grit sand and/or lava, which makes the soil more permeable to air and thus enhances drainage for:

- all succulents and xerophytes (e.g. Aeonium, Agave, Aichryson, Greenovia, Saxifraga, Sedum and Sempervivum)
- all Liliaceae and Bulbs (e.g. Bellevalia, Crocus, Hyacinthus, Iris, Lilium, Muscari, Narcissus, Romulea, Scilla and Tulipa)
- all palms

increase in the amount of humus/peat, in order to receive a leafy, slightly moist and acidic substrate which is especially well suited for:

- all Primroses (Primula) and Shooting Stars (Dodecatheon)
- Strawberry Trees (Arbutus) and other members from the Ericaceae
- many subtropical fruit plants and tropical plants
- in general all plants, for which "a humus rich soil" is mentioned in the web shop.

Unless otherwise noted in the web shop, the sowing medium should always be rather well drained, which prevents seeds and later on seedlings from rotting due to excessive humidity. Especially bulbous plants prefer a very well drained soil rather than having their "feet" to wet. Few species require a constantly wet soil (e.g. Calla palustris, both Lysichiton species, and many Primroses as well as certain Iris from very moist subalpine meadows and habits alongside streams). More detailed information on specific requirements for most species you will find in the web shop.

Besides that it is strongly recommended not to fertilize soil until seedlings are showing strong growth! A **soil which is rather low in nutrients** will enhance root growth and will lead to healthier plants. Roots of seedlings may be negatively affected by even an average dose of fertilizer.

III. Depth of Sowing

A general rule is: "the smaller the seeds, the more they want to see the light!"

In other words, all **seeds which are tiny or even dust-like** (e.g. those of Campanulaceae, Crassulaceae, Primulaceae, and Scrophulariaceae), **shall not be covered with soil**. Pots should always be watered from beneath in order not to spill the seeds all over. You will receive best possible germination rates if sowing-pots are covered with a transparent plastic foil or any ordinary glass to prevent desiccation of soil and of seeds. Pots should be placed in a shaded place until



germination occurs, thus pots will not overheat in full sun (just think of a greenhouse effect). As soon as these seedlings appear, open the cover a little bit to let in fresh air and to strengthen seedlings. Remove the cover completely after a couple of days, or as soon as seedlings are strong enough. Seeds from winter hardy perennials as well as bulbous plants shall be covered with some 1cm/ 0.4" soil layer, which protects them sufficiently in winter. All other seeds which have rather large, countable seeds might be covered with soil up to two or three times their diameter (e.g. Annona, Erythrina, Ravenala, Strelitzia and Dracaena draco) unless otherwise noted in the seed lists.

IV. Sowing Time and Temperature

You may want to download a **table with all plant genera and their specific sowing months and minimum sowing temperatures** as PDF-file (19 pages, 94 kB):

http://www.rareplants.eu/shop/uploads/files_versions/table_sowing_months_Rareplants.eu.pdf

Seeds from very **hardy species**, i.e. from plants **hardy to USDA Climate Zone 8, 7 or 6**, shall be potted **from September to end of March**. It is essential, that you place pots outside in a sheltered spot where they receive sufficient moisture but will not be damped wet in winter. Most hardy plants will show better germination results if they are stratified (frozen) at least once or are cooled at least for a couple of weeks. If seeds are potted in autumn, some might well start germination before winter, yet most will not develop leaves before mid to late spring. If you sow certain species or genera too late in spring (e.g. most Peonies and Magnolia) they usually will not germinate before spring the second year. Their seeds require a cooling period of at least 8 weeks at some +7°C/20°F and less in order to be ready for germination in late spring. However a late sowing in general will not have any major impact on germination rates, it simply takes a little bit longer. Keep all pots with ungerminated seeds of hardy perennials and bulbs outside in a protected, shaded spot where they will receive some moisture during summer. Seeds will either germinate in autumn or following spring.

If you sow very late in the year (i.e. from mid April to beginning of June) you may want to use "a trick to convince" seeds to germinate in early summer the same year already: Place potted seeds for some 4 weeks into your refrigerator at some +5°C/17°F. After this artificial cooling period place them in a warmer and sunny spot outside. Thus certain genera will have started to germinate before summer comes in. **Important:** Seeds of most winter hardy perennials and bulbs will not germinate if you keep pots at constantly high temperatures (i.e. in a heated greenhouse, wintergarten or on a window sill inside your house)!

Non-hardy plants or plants which are hardy to **Zone 9 and higher** should be sowed at beginning of summer, when no more cold nights are likely to occur (depending on your region, this might vary from **end of May to end of June**). During day time temperatures should rise to at least some 20°C / 65°F. For certain species rather cold nights and warm days will stimulate germination and may significantly enhance germination rates. Several **tropical plants**, such as Annona, Bignonia, Bixa, Carica, Clivia, Cyphomandra, Manilkara, Ravenala, Spathodea and Strelitzia, as well as most palm species (though seedlings and plants are winter hardy!) require an average day temperature of at least 25°C / 75°F in order to germinate properly. Seeds of these plants should best be sowed during summer or throughout the year with supply of artificial heat (and light).

Proteaceae (Feather-Bushes or Sugar-Bushes) from South Africa require some different sowing methods. Detailed information on sowing and cultivation of the genus Protea are given at this page: **Sowing and Cultivating of Proteaceae from South Africa:**

http://www.rareplants.eu/shop/prodtype.asp?strParents=555&CAT_ID=554



Sowing Months and Minimum Sowing Temperature

The following table shows recommended sowing months and minimum sowing temperature for all genera listed in our web shop. Months are noted in Roman numerals, where I = January and XII = December. Data are given for the northern hemisphere (i.e. Europe, Canada and USA, northern Asia, and Japan). Times will differ accordingly in the southern hemisphere (e.g. Australia, South Africa and South America).

Please note that the list below gives only a very generalized overview. Please refer to the genus as well as the species' description in the web shop for more detailed information on sowing conditions for each species (e.g. light, water, substrate) as well as on strongly deviant sowing conditions for certain species within these genera.

Key to colors

Optimal sowing time
Natural sowing conditions are adequate for most species. **Winter hardy species** will germinate only in following spring with a prior cooling period of several weeks or months. This cooling period is **essential** for a later germination for all species given 5°C as minimum temperature! Seeds of **subtropical** as well as **tropical species** will germinate initially from late spring to mid summer at other high temperatures in full sun. **Annuals** should be always sowed within this suboptimal sowing time.

Several **winter hardy species** may not germinate before spring the following year. Most **subtropical and tropical species** may require artificial heat and/or light for optimal seedlings growth. Many species from Mediterranean climate, as well as most **exotics from the Canary Islands** will not germinate in summer heat, but their seeds will stay in a dormant dormancy until autumn/winter when germination will occur.

No recommended sowing time
Germination may take much longer and/or germination rates are lower. In general seedlings of **subtropical and tropical plants** will require artificial heat and light. These seeds in original plastic envelopes in a dark and cool place at some 5°C until sowing.

Genus	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Minimum temperature
Zelenicouthis (Orchid)													20°C
Aloeus (Liquidity Shrub)													20°C
Alouba (Flowering Maple)													20°C
Xylocopa (Wasp Orchid)													20°C
Xylocopa (Cockle Shrub)													20°C
Acrostichum (Paddy Herb)													0°C
Acrostichum (Winter Hardy Finger Arabis)													0°C
Acrostichum (Dumbbuck Cucumber)													20°C
Xylocopa (Wasp Orchid)													0°C
Xylocopa (Shrubby Shrub or Fern)													20°C
Xylocopa (Moss)													0°C
Xylocopa (Bare Thyme)													0°C
Xylocopa (Mankouki)													0°C
Xylocopa (Sambucus)													0°C
Xylocopa (Small Fruit)													0°C
Xylocopa (Fanned Flower)													0°C
Adenocaulon													20°C

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V. Germination

The period of time seeds may take to germinate greatly depends on species and might start well in some genera after little more than three days, e.g. most *Aeonium*, *Aichryson* and *Digitalis*. Some might take up to four months such as *Canarina canariensis*, most winter hardy perennials, shrubs and trees, as well as bulbs which need some cooling period prior to germination.

As soon as germination starts, most seeds will germinate within a couple to weeks. However certain species and genera show a rather irregular germination process, the last seedlings may show quite late. This especially applies to *Canarina canariensis* (new seedlings may show up to one year!) and all *Strelitziaceae* (seedlings occur for a period of some 8 months). Thus always be patient and wait for the last plants to pop up. Give pots with ungerminated seeds sufficient time!

VI. Cultivation of Seedlings

As soon as seedlings appear, they should be hardened by providing fresh air and moving pots into a half-shaded. After a couple of weeks sun loving plants may be moved to full sun, while others from fresh and shaded spots in nature (woodland plants such as *Hosta*, *Jeffersonia*, *Polygonatum*, as well as many Primroses from Asia) shall always be in a shaded spot as direct sunlight may burn their leaves. Succulents and xerophytic plants prefer a rather sunny spot as soon as they have germinated. Young plants should be watered on a regular basis (in hot summers probably daily), so that soil and their tender root systems will never fall completely dry.

Most **winter hardy species** will grow rapidly and might be flowering size within two to five years. *Aquilegia*, *Digitalis*, and *Primula* species will even flower within two to three years, most *Iris* and many other bulbous plants within three years. Shrubs and trees and several tropical plants, such as Travelers' Tree, *Ravenala madagascariensis* and most palms take much longer or may not flower at all if grown in pots in a temperate or cool climate.

All sowing pots with hardy species might be kept in the open garden in a sheltered place throughout the year. However please ensure that pots will never freeze through completely for a longer time, which might result in a total loss of seedlings. To be on a secure side, all hardy plants which produce bulbs/corms/rhizomes/tubers might be covered with a thick mulch layer or alternatively pots can be stored in a very cool, yet frost free place during winter. Temperatures should not rise significantly above 12°C/ 50°F in order to prevent premature new growth during winter under still unfavorable growing conditions.

Members of the *Crassulaceae* family from the Canary Islands (i.e. *Aeonium*, *Aichryson* and *Greenovia*) as well as most Canary plants require a slightly different cultivation method. After sowing they will usually germinate rapidly, but then they will grow very slowly during summer. *Crassulaceae* may not exceed the size of a pinhead in their first summer, if sown in spring. All Canary plants will usually show strong growth as soon as days become shorter in combination with a significant drop in temperatures during night in autumn. This is an adaptation to their habitat of a dry summer season and sometimes heavy winter rains. During their first winter they should all be kept in a very sunny and warm place with sufficient water to keep them growing. The best time in the year to sow these is in winter to spring, from September through April. Some *Aeonium* species, e.g. *Aeonium ciliatum*, *Aeonium rubrolineatum*, and *Aeonium urbicum* will gain already about 15 cm/5.5" in their first winter! As most Canary plants these will be flowering size in less than three to four growing cycles under favorable conditions.

For additional information on **succulents from the Crassulaceae family native of Canary Islands**, please have a look at this page: **Sowing and Cultivation of Aeonium, Aichryson and Greenovia**:

http://www.rareplants.eu/shop/prodtype.asp?strParents=555&CAT_ID=558

Some additional information on **Echium (Macaronesian Shrub Burgloss) species** you find at this page: **Sowing and Cultivation of Macaronesian Echium**:

http://www.rareplants.eu/shop/prodtype.asp?strParents=555&CAT_ID=556

VII. Transplanting/Planting Out

All **Liliales** (*Alliaceae*, *Amaryllidaceae*, *Hyacinthaceae*, *Iridaceae*, *Liliaceae*, etc.), all **Araceae**



(Arisaema, Amorphophallus, Arisarum, Arum, Biarum, Calla, Dracunculus, Typhonium and Zantedeschia) as well as **Cyclamen** species will do best if seedlings are not separated before the end of their second to third growing cycle, as soon as they start dormancy. They prefer growing in dense clusters in the first two to three years. Keep in mind that slugs and earthworms just love solitary young bulbs and may erase them within one day in the open garden.

The very resistant and fast-growing species of most **Allium** might be transplanted in their first year in autumn in a sheltered place with some protection from excessive moisture in winter.

Most other plants, which do not have bulbs or comparable storage organs, might be carefully pricked out and separated a couple of weeks to months after sowing, or as soon as the third fully developed leaf has emerged. It is essential to separate fast-growing plants as early as possible so that their root systems will not mix up which might make it rather difficult to separate them properly without destroying their root system completely. Aquilegia, Canarina, Digitalis, Gentiana, Isoplexis, Primula, Saxifraga, Sempervivum and Sedum species should not be pricked out until they show significant growth.

Peonies (Peony species) should always be sown in a rather large pot in order not to disturb their roots before they are large enough for being planted out to the open garden. Paeonia greatly dislike any disturbance of their fleshy root system! Once transplanted leave them alone for decades so that they will increase in flowers from year to year.

VIII. Seed Storage and Viability

All seeds (including those from tropical species, unless noted differently in the web shop) which are not sowed upon receipt **should be stored at some +5°C/40°F in your refrigerator** in their original and sealed packages until they are potted, in order to ensure and to maintain high germination rates. If seeds are kept open at room temperature without any special protection, some might lose their viability within a couple of weeks due to desiccation and chemical-biological processes of seed aging. On the other hand a constantly high level of relative air humidity in combination with high temperatures might yield to spontaneous germination or complete losses due to fungal infections. Provided these storing conditions, all seeds can be **stored for at least 1 year**, without any significant drop in viability. Seeds with a very limited shelf-life have to be sowed upon receipt and will be available after harvest for a short time in the web shop only. Amongst these perishable items are bulbils of various liliales, such as Allium, Haemanthus, Lillium, and Lycoris.

