Cypripedium

Lady-slippers for the garden have become increasingly available in recent years. The species offered for sale used to be imports from China that one should avoid because they were illegally digged in nature, often mislabelled, and dry with low chances of surviving. But things have changed so that many species are now available from specialist nurseries such as albiflora.be and hybrids can be found at many garden centres. The hybrids and some species are very easy to grow, other species are only for the experienced gardener.

In vitro propagation. Cypripedium has a reputation of being difficult to propagate in vitro, and this is true to some extent. I suspect that many negative results have come from selfing of mother plants as it seems that many Cypripedium species are partly self-sterile, leading to poor germination and browning of developing protocorms that die after some time. Other Cypripedium species are self-pollinatiing (autogamous), for instance C. passerinum (9), probably a response to its Arctic habitats where pollinators are sparse. For C. shanxiense, selfing was first observed around Vladivostok by the Russian orchid specialist Leonid Averyanov (10). Some Cypripedium hybrids, are also self-compatible, if the parents are not too distantly related, and healthy plant may be produced by selfing.



The hybrid *Cypripedium* Ulla Silkens gx (*C. reginae* x \overline{C} . *flavum*) is self-fertile like many *Cypripedium* hybrids where the parents are not too distantly related.



Selfed *Cypripedium reginae* with inbreeding problems. Many of the protocorms showed browning and eventually died.



Healthy protocorms from a selfed *Cypripedium* Ulla Silkens (*reginae* x *flavum*) with no genetic problems.

The green pod method is the most reliable method, embryos inside because the small mature Cvpripedium seeds are surrounded bv an impermeable cell layer. According to the literature, this cell layer matures from 49 to 56 days after pollination (6). I usually take the pods 55-60 days after pollination when the seeds are white, yellow or sometimes light brown but the optimal time



Protokorms from a selfed *Cypripedium pubescens, 2* months, sown from green pods 54 days after pollination.

Depends on the species with Northern species generally being faster. In *C. subtropicum*, for instance, fertilization takes 60 days and optimal sow time is 105 days after pollination (7).

Mature seeds are more difficult, but not impossible with seeds from *C. reginae*, *C. flavum*, *C. passerinum* and *C. macranthos* when exposed to



Cypripedium reginae from mature seeds.

1% hypochlorite for 30 min before sowing (5). Incubate flasks in the refrigerator at 5° C for 3 months. The importance of chilling is variable in the scientific literature, but in general the germination percentage seems to go up (2). Several references indicate that cypripedia will germinate better with



Cypripedium (fasciolatum x macranthos) x henryi, 12 months after sowing from a green pod and ready for winter in the fridge.

cytokinin in the medium (1,3). Luckily, potato contains some cytokinin (3). Chemical cytokinins like benzyl-aminopyrin and kinetin are mutagenic and I would not use them in the kitchen.



Cypripedium passerinum from mature seeds. *C. passerinum* is selfpollinating (9). Being a subarctic species, the seedling are heath-sensitive and I lost all in the garden during a heath wave.

During winter, I keep seedlings in the refrigerator at 5 degrees C for at least 3 months. Small seedlings, that need another year before deflasking, can be chilled in the seedling flask, for larger seedlings, I take the seedlings out of the flasks, wash with tap water to remove agar and store them in the fridge



in closed plastic bags. In March, I plant the seedlings in boxes in a mixture of 1 part clay loam, Deflasked and washed *Cypripedium* seedlings spend December-January-February in the fridge before planted in soil in the greenhouse in March.



Cypripedium flavum from seed.

1 part coarse sand and 1 part moler clay pebbles (cat litter pebbles). I water with tap water for the species that tolerate lime and with rain water for the rest. I add liquid tomato fertilizer in a concentration approximately 1/8 of what is recommended for the tomatoes. I water with plenty of water to wash-out accumulated salts that may otherwise damage the roots. I warm periods, I use plain water without any fertiliser.



Cypripedium parviflorum from seed.

In the garden. Most hybrids and many species can be grown in the garden without special care much like any perennial. They generally like a half-shaded spot, a good clay loam that is not too heavy and plenty of water during the growing season. They need occasional feeding with a slow-release fertilizer, that does not burn the roots. Cyps with superficial roots like mulching with bark chips or pine needle duff to keep the ground moist and cold.



Cypripedium reginae and its hybrids can be grown in full sun but the root are shallow and need mulching and plenty of water.

They fast-growing cyps need division when they have approximately 15 shoots. In autumn or early spring, simply dig up the plant, clean the roots with water from a garden hose and break the rhizome into pieces that have 2-3 shoots. Each piece can now be planted and usually will grow well if given extra water in the following summer. For stronggrowers like Ulla Silkens, it may be necessary to use a shovel to break the rhizomes.

Cypripedia can be very impressive garden plants with +50 flowering stalks if they are not divided. It is, however, a gamble because the center of the plant becomes weaker end weaker and at some point, it will be prone to fungal infection and the whole plant dies. Big, old plants are showy, but keep a few divisions in the vegetable garden for insurance.



Cypripedium Ulla Silkens gx (reginae x flavum) multiply rapidly when given a bit of fertilizer and plenty of water



Cypripedium Sabine Pastel gx (*fasciolatum* x *macranthos* alba).



Cypripedium Ulla Silkens gx second year after division.

Species from continental climates. The late Holger Perner was an expert on Chinese orchids and founded the famous Hengduan Mountains Biotechnology's nursery in Huanglong. He described the natural growing conditions of the Huanglong slipper orchids C. sichuanense, C. bardolphianum, C. palangshanense, C. guttatum, C. plectrochilum, C. henryi, C. shanxiense, C. flavum, C. calcicolum (syn. C. smithii), C. franchetii and C. tibeticum in the following way: "All receive a dry and cool to cold winter in the Minshan. At altitudes from 3000 m and higher the soil is frozen from October to April, and a snow cover of a few to several centimeters can only be found where the winter sun cannot reach the ground. Elsewhere, the upper 2 cm are bone dry during the winter and the ground below frozen to half a meter or more. At altitudes around 2300 m there is also no snow cover and the soil is frozen from approx. November to March" (8).



Chinese and Japanese species overwinter in a covered frame.

The growing conditions are continental and far from the Danish winter which has lots of rain and repeated freezing and thawing. I therefore grow most Chinese and Japanese *Cypripedium* and some American *Cypripedium* in frames that are covered with transparent PVC plates from mid November to the end of March and with plenty of mulching to keep the roots cool and moist during summer. Only *C. henryi* and *C. flavum* do well in the open garden without any special care.

C. japonicum and *C. formosanum* start to grow early in spring which is a problem in Denmark where spring is unreliable and often comes with late frost. For these species, is may be necessary to keep the cover on the frames well into April. They also do not need division as they spread by creeping rhizomes.



Cypripedium japonicum needs good space because of the creeping rhizomes that wander about.





Cypripedium yatabeanum (top) and *Cypripedium guttatum* (bottom) are two Northern species for the winter-covered frame. They have creeping rhizomes and hate warm and dry conditions in summer.

The *Trigonopedia* **section.** Some of the *Trigonopedia* slipper orchids are almost mythical in the orchid community. For many years, one could only dream about these rare beauties from China. Now, however, some *Trigonopedia* species have been raised in quantities in vitro by expert labs such as Albiflora (<u>www.albiflora.be</u>), but they are still rare and demanding to grow and will never be mainstream plants.

I grow two of the spotted leaf types in the garden, C. lichiangense and C. margaritaceum ssp. fargesii. They both have a robust appearance, short stature with the two large leaves pressed against the ground. The leaves have brown spots that resemble fungal attack. The flowers are nodding and difficult to see, but in my opinion some of the most spectacular in the genus in a hard-to-describe way. *C. margaritaceum* ssp *fargesii* is distinguished from *C* margaritaceum by the hairy sepals and a bigger flower. The exact taxonomic status of this cyp is much debated. Some give it species rank (C. fargesii), some give it subspecies rank (C. *margaritaceum ssp fargesii)* and some merely consider it to be a variation of *margaritaceum* (C. margaritaceum var. fargesii). Similar plants have also been traded under the names C. daliense and C. sichuanense. I tried C. bardolphianum in a garden frame, but only managed to keep it alive for a few years.



The Chinese *Cypripedium margaritaceum* ssp. *fargesii* from the *Trigonopedia* section is an interesting species but not for the beginner.



Cypripedium margaritaceum var. fargesii leaves.

C. lichiangense is also considered difficult to grow and *fC. argesii* should be even worse ("tricky to grow", "sensitive and unforgiving", "not for the beginner", "not for the open garden"). In my experience, they can be grown in the garden in spite of the wet Danish winters. I planted seedraised plants of both of them in a shaded frame in neutral loam soil mixed with sand. The trick is probably to cover the frame in winter to protect against rain, to avoid organics in the soil, and to cover the ground with a layer of wood chips or pine needle duff to avoid soil splash on the leaves and to keep the ground cool.

I guess their bad reputation is to some degree caused by the wild-collected, dry imports with damaged roots that have been smuggled out of China and sold on Ebay. Fortunately, seed-raised plants of several *Trigonopedia* species are now available from from reputable nurseries (e.g. albiflora.be), but at quite inflated prices.



Cypripedium lichiangense is another *Trigonopedia* species that is tricky in cultivation.



C. yatabeanum



C. segawai x fasciolatum



C. Kentucky gx.



C. guttatum



C. parviflorum



Cypripedium Pueblo gx



C. franchetii x tibeticum



C.. henryi





C. reginae alba

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