Lady Slippers, terrestrial orchids, both native and non native forms, are so easy to grow for a number of gardeners, while still others experience failure, time after time. Why the disparity? The most likely culprit for the latter is a lack of understanding of the orchids special needs. An understanding of the characteristics, the likes, and the dislikes, will establish a sound foundation, ensuring success.

Let's look are some of the pitfalls that gardeners can fall prey to, and shed some light on these issues by sharing our growing experiences. Of course we cannot guarantee your personal success in growing terrestrial orchids, however, if you practice these next eight steps, you will be well on your way to years and years of garden delight. These are truly amazing plants, worthy of a home in your garden.

Once mastered, large established beds of terrestrial orchids will be the envy of every guest to your special garden. They really are easy and require very little care once established. Many are extremely long lived as adults, living 125 years, adding multiple blooming stems each growing season. Most forms are bunch forming types. We routinely see blooming stem bunches adding 2-3 additional bloom stems each year at Great Lakes Orchids Nursery. These bunches can be lifted, dug up and divided similarly to hostas. The present protocol for maintaining large multi-stem specimens is not to allow plants to support over 50 stems. Although these extra large specimens are gorgeous, there is an increased chance of mishap at this stage. Root rot, or some other unforeseen disaster could kill the plant. At this stage, it is recommended that the plant be lifted and divided into smaller clumps, so that its vigor can be maintained.

We'll start the discussion with "first year seedlings" out of flask. As an option to gardeners, these young juvenile plants are made available to fulfill two basic needs. First, there is the issue of economics. One's budget may not sustain the financial drain imposed by purchasing $50-$125 dollar adult specimens. Pricing in the $5-$8 dollar range may allow greater flexibility in budgeting. Secondly, a small dedicated and passionate group of gardeners not only enjoy, but fully embrace the challenges and subsequent rewards of nurturing those seedlings from delicate babies to full blooming adulthood. Whatever the reason, both groups are presented with formidable challenges.

Picture: Cypripedium Acaule in flask – ready for de-flasking

Picture: Cypripedium acaule – out of flask seedlings-Very few Labs are offering this species – until recently, all C.acaule found in the trades were wild dug plants. Today, TC seedlings and adults are available-however, wild dug plants are still marketed at nurseries and over the net.

Cypripedium acaule: 10,000 C. acaule first year seedlings out of flask

Picture: First year seedlings set in 3" pots – Cypripedium reginae – Great Lakes Orchids

"My seedlings looked fantastic out of the package, but they soon died." What went wrong?

1. ***Sun Load:*** *First year seedlings require more sun protection compared to their adult counterparts. If the adult specimens enjoy 4 hours of direct morning sun, followed by high dappled overhead shade, then the seedlings will require 30% less sun load for the first season compared to the adult plant.*

2. ***Soil:*** *In nature, plants have evolved over eons of time in a delicate balance with the soil, soil microbes, and other plants in regards to available moisture and nutrients. In our gardens, we must obtain a balance, by using well prepared soil, selecting and placing plants properly, and providing sufficient water during dry spells. Soil mycorrhizae have an important role to play in this delicate balance in nature and in our gardens.*

   "The finest things are the most thoughtfully made"

   A balance between moisture retention and good drainage is frequently referred to in the literature as: "Needs a moisture-retentive soil that is well

drained". Therefore, the soil mix requires adequate organic material (humus-compost-manure-leaf matter) mixed into it to absorb and retain water, and at the same time enough drainage material (sand-gravel-perlite) to allow excess moisture to drain through.

In pursuit of the ultimate soil mix, the gardener is inundated with hundreds of special mixes, personal concoctions, and commercial blends, all proposing to be the ultimate mix for your growing needs.

"Sometimes, a little common sense goes a long way."

Too many times, the gardener is lead to believe that this magical mixture will be the "yellow brick road" to guaranteed success. The quest for the ultimate soil blend becomes a burdensome task. An excellent, balanced friable soil mix tailored to a specific orchid does not need to be such an overwhelming, frustrating ordeal.

For the woodland orchid species, using forest duff, the top 2-3 inches of soil from a mature hardwood forest is excellent. Oak, maple, and beech trees produce an excellent friable soil mix.

Prepared commercial mixes will perform well also. Metro-Mix 560 SunCoir can be effectively used for many terrestrial orchid species.

Soil amendments can adjust MM560, thus expanding the species list that it can service. We provide detailed soil requirements for each species we offer. This information is sub-listed under each item in our product list.

3. ***CEC*** *– Why is this important? Science has cleverly put numbers on certain aspects of soil analysis allowing us to discuss these characteristics in more detail. The cation-exchange capacity, (CEC), is defined as the degree to which a soil can adsorb and exchange cations*

   Cations – positive charged ions (NH4+, K+, Ca+, FE2+, etc.)

   Soils and organic matter have negative ionic charges on their terminal functional group ends, at the molecular level. The positive cations are

attracted to these negative charged sites in the soil matrix and are effectively held in place.

Simply stated, the higher the CEC value, the greater the capacity to hold more cations in the root zone.

Typical CEC values for common soil types.

Soil Texture	***CEC (meq/100g soil)***
Sands (light)	3-5
Sands (dark)	10-20
Loams	10-15
Silt loams	15-25
Clay loams	20-50
Organic soils	50-100

Fortunately, plant roots have biological and chemical mechanisms for harvesting these ions from the soil for their own needs. Complex relationships exist between plant roots and soil borne mycorrhizae, bacteria, and fungi that allow for a synergistic relationship, a cooperation in the utilization of the soil minerals and ions, both cations and anions.

This complex biological mechanism is affected by many factors. Excesses and or deficiencies of certain minerals, cations, anions, ph ranges, and moisture levels effect many aspects of this equation. High levels of one particular category may grossly inhibit absorption of other required cations.

Some terrestrial orchids, particularly the Asian forms, are grown on soils with low CEC ratings. Later, we will recommend low-med-high CEC ratings in our growing instructions.

4. ***Fertilizer:***

   "Some orchids survive and prosper better on neglect than on too much attention, especially when fertilizers are concerned"

   Generally speaking, ¼ strength fertilization protocols are considered the norm when orchids are discussed. This rule of thumb is a good starting point for fertilization. It allows the complicated balancing act in the soil to more closely remain in tune meeting the orchids light feeding requirements.

5. ***Water:*** *Much has been written concerning water preferences and requirements concerning terrestrial orchids. Folks jump through labor intensive hoops to satisfy their ideas about watering protocols. It simply is just not that complicated. Here at Great Lakes Orchids LLC, we simply use the standard chlorinated city water supply for 99% of our commercial watering needs. The chlorine and the fluoride in the municipal water system are just fine for the lady slippers. There are two exceptions on this water issue. The bog orchids, and Cypripedium acaule should be watered with rain water, or DI water as we use here at the nursery.*

6. ***Bad Boys:*** *An all inclusive category for us, of all things that want to eat your plants. There is no shortage here of "the bad". For biting, chewing, sucking insects, we use "Orthene" or "Sevin". Other bad boys require special treatments. Slugs can consume your seedlings at a horrific rate, your seedlings disappearing in one evening's feast. Commercial slug bait or your favorite proven organic slug control should be in place. These night time marauders are a major player in the failure of establishing seedlings back into the wild. Special attention must be focused on slug control!*

7. ***Critters:*** *Oh the stories we have shared. Whitetail deer, raccoons, skunks, woodchucks, rabbits, squirrels, ground moles, voles, and mice……do the lists never end!!!!*

Cypripedium acaule – 3 year old potted plants –October- plants are going dormant for winter- Mr. Squirrel with his own agenda.

8. ***Fungus:*** *While some fungi are our good friends, there are a number that are far less than friendly. The parasitic fungi causing root rot and damp off are always present and need to be controlled. One way to control this problem is to grow the terrestrial orchids on low (CEC) rating soil mixes. Low organics in the soil mix helps to control parasitic fungi. This is a common practice among commercial terrestrial orchid growers. Here at Great Lakes Orchids, we use systemic fungicides for our seedlings, applied religiously on a scheduled format to maintain control. After the seedlings reach an age of 3 years, fungicides are rarely needed in these near adult beds. We also use low (CEC) rated soil blends for some of the Asian forms of cypripediums.*

Developing an understanding of these eight categories will go a long ways toward your successful gardening endeavors with terrestrial orchids. Later, we will individually expand on each of the orchids that we grow here at the nursery with step by step details ensuring your success.

We do not recommend that 1st year cypripedium seedlings be out-planted back into the wild for the purpose of species re-introduction, or re-establishment. The

mortality rate is simply too high. First year seedlings typically require more attention than Mother Nature herself can provide in the wild. If out-planting is the goal, then container raise your seedlings at home for the first 3 years. Three and four year old cypripediums are more suitable for out-planting to wild conditions.

Garden Cultures:

Cypripedium acaule:

Family: *Orchidaceae (or-kid-AY-see-ee)*

Genus: *Cypripedium (sip-rih-PEE-dee-um)*

Species: *acaule (a-KAW-lee)*

Common name*: Pink Lady Slipper, Stemless Lady slipper, Moccasin Flower*

Existing on a variety of soils compositions, from peat, sand, clay, swamp forests and sphagnum bogs. Requires very acidic soils (PH 4.5-4.0) are typical, with some plants even thriving at (PH 3.5). In the far north, tolerates full sun, to high dappled shade in the southern ranges. Commonly associated with white pines but can also be found in hardwood forests.

Recommended soil mix: *40% sphagnum peat moss + 40% quart sand + 20% white pine forest duff. By volume, this would read as 4 parts sphagnum peat moss, by 4 parts quartz sand, by 2 parts white pine forest duff. The sphagnum peat moss is the dried compressed bale type, available at your local garden centers. CEC=med-moderate.*

Fertilization: *None required – not recommended*

Water: *One of the few cypripediums that we recommend rain water or DI water. Acidify the water to PH 4.0 on every third watering. If you do not have a PH meter, you can add two tablespoons of vinegar to each gallon of water and have good success. Water thoroughly, with a drenching soak. If plants are naturalized in an outdoor setting and receive ample moisture from rains, make sure that you still apply the acid water treatment once every three to four weeks through out the growing season. Apply your first acid water treatment early in the spring, just after the snow disappears for the season, before the new buds emerge from the soil. The*

melting snow pack, and spring rains will affect your PH levels and need to be adjusted. This early season acid treatment is important! Your last acid treatment should be 4 weeks after the plants have gone dormant in late fall. Here in Michigan, that is last week in November.

***Insect control**: Orthene when required.*

***Fungus control**: Typically not a problem, the acidic soil conditions are protective against a large number of parasitic fungi, parasitic bacteria, and soil born disease.*

***Slugs:** Commercial slug bait.*

***Overwintering:** Protect dormant eyes and buds from mice, voles, and squirrels. Hardware cloth may be used; remove early in spring as this is one of the first cypripediums to break dormancy.*

Cypripedium reginae:

***Family:** Orchidaceae (or-kid-AY-see-ee)*

***Genus:** Cypripedium (sip-rih-PEE-dee-um)*

***Species:** reginae (ree-JIN-ay-ee)*

***Common name:** Showy Lady's slipper, Pink and white Lady slipper, Queen's Lady slipper*

Existing on a variety of soil compositions, but generally associated with calcareous soil types. This species is truly a calcium lover. It can be found in openings in hardwood forests, fens, roadside ditches, raised hummocks in bogs, but the common denominator is calcium. Enjoys full morning sun with high dappled shade in the hot afternoon. Tolerates, and even enjoys, wet feet and tends to be found in higher moisture laden sites. One of our most versatile garden orchids, as it tolerates a wide range of garden soils that are fortified with Calcium applied as limestone grit, or ground oyster shells. Thoroughly mix the limestone throughout the entire vertical range of your soil mix as Ca+ does not migrate through the soil strata very well, tending to maintain its original placement in the soil. With proper soil conditions, this is the easiest terrestrial orchid for the home gardener to enjoy.

Recommended soil mix: *MetroMix 560 SunCoir, amended with 1 cup of limestone grit per gallon of soil mix. A good rich garden soil may be used, adding 1 cup of limestone to each gallon of soil mix. PH (6.5-7.5) CEC=high*

Fertilization: *Enjoys regular feedings of ¼ strength fertilizer. We use water soluble fertilizer. Stop fertilizing when flowers open.*

Water: *Typical water supply, city, well, rain water, etc. Municipal chlorine and fluoride is not a problem in any way, its fine.*

Insect control*: We use Sevin, before flowers open, and systemic Orthene if required.*

Fungus control*: Use a systemic fungicide as per labeled directions.*

Slugs: *Commercial slug bait. (Critically important for seedlings)*

Overwintering: *Protect dormant eyes and buds from mice, voles, and squirrels. Hardware cloth may be used; remove early in spring before they break dormancy in spring. C. reginae is one of the later cypripediums to break dormancy – patience is required as it may come up several weeks later than other cyps and you don't want to damage the buds by early season weeding in the perennial beds.*

Cypripedium parviflorum:

Family: *Orchidaceae (or-kid-AY-see-ee)*

Genus: *Cypripedium (sip-rih-PEE-dee-um)*

Species: *parviflorum (par-VEE-flor-um)*

Common name*: Small yellow lady slipper, Lesser yellow lady's slipper*

Existing on a variety of soil compositions, but generally requires a slightly acidic condition, PH 5.5 is typical. It can be found in openings in hardwood forests, and roadside ditches, and grassy fields, but the common denominator is PH, PH=5.5 Enjoys full morning sun with high dappled shade in the hot afternoon. Tolerates moisture but sites should be well drained. Can be found on gradients and slopes that provide good drainage. Common name: Small Yellow Lady Slipper.

Recommended soil mix: *MetroMix 560 SunCoir, amended PH to 5.5. CEC=medium*

Fertilization: *Enjoys regular feedings of ¼ strength fertilizer. We use water soluble fertilizer. Stop fertilizing when flowers open.*

Water: *Typical water supply, city, well, rain water, etc. Municipal chlorine and fluoride are not a problem in any way, they're fine.*

Insect control*: We use Sevin, before flowers open, and systemic Orthene if required.*

Fungus control*: Use a systemic fungicide as per labeled directions*

Slugs: *Commercial slug bait.*

Overwintering: *Protect dormant eyes and buds from mice, voles, and squirrels. Hardware cloth may be used; remove early in spring before they break dormancy in spring.*

Cypripedium pubescens:

Family: *Orchidaceae (or-kid-AY-see-ee)*

Genus: *Cypripedium (sip-rih-PEE-dee-um)*

Species*: pubescens ( )*

Common names: *Large yellow lady slipper, Greater yellow lady's slipper, Yellow moccasin flower, Neverroot, Noah's ark, American valerian, Whippoorwill' shoe.*

Existing on a variety of soil compositions, but generally requires a slightly alkaline condition, PH 6.0 -7.5 is typical. It can be found in openings in hardwood forests, and roadside ditches. Enjoys full morning sun with high dappled shade in the hot afternoon. Tolerates moisture but sites should be well drained. Can be found on gradients and slopes that provide drainage.

Recommended soil mix: *MetroMix 560SunCoir, amended with limestone grit to add calcium. A hardwoods forest duff soil mix is fine, just add calcium. CEC= high*

Fertilization: *Enjoys regular feedings of ¼ strength fertilizer. We use water soluble fertilizer. Stop fertilizing when flowers open.*

Water: *Typical water supply, city, well, rain water, etc. Municipal chlorine and fluoride are not a problem in any way, they're fine.*

Insect control*: We use Sevin, before flowers open, and systemic Orthene if required.*

Fungus control*: Use a systemic fungicide as per labeled directions.*

Slugs: *Commercial slug bait.*

Overwintering: *Protect dormant eyes and buds from mice, voles, and squirrels, hardware cloth may be used; remove early in spring before they break dormancy.*

Cypripedium candidum:

Family: *Orchidaceae (or-kid-AY-see-ee)*

Genus: *Cypripedium (sip-rih-PEE-dee-um)*

Species: *candidum (KAN-did-um)*

Common name: *Small white Lady's slipper, White Lady's slipper*

This species is the most sun loving of all the native cypripediums. It requires full sun for most of the day. It can tolerate high overhead dappled shade but will not bloom to its full capacity in shaded areas. Existing on a variety of soil compositions, but always associated with calcareous compositions. This species is truly a calcium lover. It can be found in openings in fens, and roadside ditches, grassy fields, and prairie sites, but the common denominator is calcium. When amending soil mixes, thoroughly mix the limestone throughout the entire vertical range of your soil mix as Ca+ does not migrate through the soil strata very well, tending to maintain its original placement in the soil.

Recommended soil mix: *MetroMix 560 SunCoir amended with 4 cups of limestone grit per gallon of soil mix. A good rich garden soil may be used, adding*

4 cups of limestone to each gallon of soil mix. Oyster grit from the local feed mill commonly used for chickens works well also. CEC=med-high

Fertilization: *Enjoys regular feedings of ¼ strength fertilizer. We use water soluble fertilizer. Stop fertilizing when flowers open.*

Water: *Typical water supply, city, well, rain water, etc. Municipal chlorine and fluoride are not a problem in any way, they're fine.*

Insect control*: We use Sevin, before flowers open, and systemic Orthene if required.*

Fungus control*: Use a systemic fungicide as per labeled directions.*

Slugs: *Commercial slug bait.*

Overwintering: *Protect dormant eyes and buds from mice, voles, and squirrels. Hardware cloth may be used; remove early in spring before they break dormancy in spring.*