

Three classes of substrates for Asian, and other species: Limestone Natives, Granite Growers, and Dipterocarp Forest Species.

The limestone natives: this is the majority of Asian species. If you are growing a Vietnamese or Chinese species, the odds are very high that it is a limestone native. Section *Coelocentrum*, limestone natives. Viet-exception: *austroviyetnamica*, granite grower. Note about *cathayana*, while *cathayana* can be grown successfully in Pro-Mix or Sphagnum moss plus perlite, the later medium makes for a more "easy grow" experience.

Limestone native medium: Following Darrin Norton's (MountainOrchids.com) example, many have found Pro-Mix with Mycorrhizae and Biofungicide, with added chunky perlite a good choice. Other, different, potting mix brands can be used so long as two conditions are met. First, and this is almost always the case, the mix should include lime, dolomite or quicklime, to buffer (raise) the pH. And secondly, the mix should not contain anything that will mold in a terrarium. I know successful growers who use Foxfarm's Cocoloco, and Vermafire; also Happy Frog potting mix and Ocean Forest by Fox Farm. All of these work well. Akadama can also be used especially for cliff dwellers. Another option is adding more perlite, which is alkaline, by nature. Chemical free hardwood charcoal (not briquets) raises medium pH. English growers use chalk (made from calcium, like limestone) in their mediums for limestone natives. The kind used for chalk boards can be used.

For all begonias, but especially limestone natives, unless you are watering with tap water, please verify that your fertilizer lists calcium as an ingredient, or otherwise provide a source of Calcium. Calcium nitrate is inexpensive and available on Amazon and EBay. Azomite Rock Dust is a great source of Calcium and other plant nutrients/micronutrients. Lack of sufficient calcium is a barrier to seed making. Many fertilizers do not include calcium.

The species: *Sizemoreae*, *malachosticta*, *pteridiformis*, *breviramosa*, *bipinnatifida*, *leprosa*, *jiewhoei* (treat as cliff dweller), *tigrina*, *wadei*, *arachnoidea*, *namkadingensis*, *subcoriacea*, *andersonii*, *burtii*, *chaiana*, *congesta*, *corrugata*, *lailana*, *pendula*, *pleioclada*, *paoana*, *rubida* and *speluncae*, *pulvinifera*, *debaensis*, *pseudodaxinensis*, *pseudoleprosa*, *semiparietalis*, *amphioxus*, *aurantiflora*, *melanobullata*, *ferox*, *burkillii*, *handelii*, *luzhaiensis*, and the list goes on.

This kind of medium is also good for any Brazilian or Mexican species. Most Mexican species (*imperialis*, *pustulata*) are limestone species

Granite dwellers:

Generally happy in the potting mixes listed above, though many are also cliff or crevice growers. I sometimes include Montmorillonite Calcined Clay pH 5.6, similar to but with a lower poor, or a mix of "mont clay", kanuma, akadama, and sometimes a small amount of perlite

Granite natives, red clay growers: *austroviyetnamica*, (cliff dweller, tuberous) *blancii*, *chlorosticta* (Sphagnum moss plus perlite preferred, cliff dweller) *fulgurata* (tuberous, cliff dweller), *hongkongensis*, *integrifolia* (treat as cliff dweller), *elisabethae* (Granite in Taiwan. Limestone in Malaysia),

Sandstone and dipterocarp forest species:

Large areas of South East Asia are covered by dipterocarp forest where the soils have a pH in the range of 4-4.5, very low. This is the same pH as is found in the regions where the high humidity equatorial African species grow. So, this includes *microsperma*, but not *dregei*, *englerii*, or *homonyma*. Sphagnum moss, often with added perlite often works well. For the difficult cases, I use kanuma with dispersed, finely milled, Sphagnum moss.

Species: *Atricha*, *darthvaderiana*, *ruthiae*. And though it should include *metallicolor*, *metallicolor* prefers a genetic potting mix.

Cliff and crevice dwellers, and the need for an airy medium. Cliff dwellers are evolved in spaces where the roots are quit exposed, and have lots of access to oxygen. Many will suffer root rot without an airy growing medium. *Fulgurata* is very challenging in this regard. *Elisabethae* and *variabilis* are also somewhat challenging.

Asian tuberous species, avoiding rot and dealing with dormancy. Tuberous species are very sensitive to wet feet. I leave their terrariums slightly open, to allow regular drying, than add back small amounts of water, as needed. Asian tuberous species, dormancy is in response to dry weather. When plants go dormant, the tubers need a dry(-ish) place for at least two months-three months I take cuttings at the beginning of dormancy. By providing 14 hours of lighting, the new plants skip dormancy for that year.

1, If it's not broken don't fix it. Some species just aren't that picky. And some species grow in different substrate types (different underlying geology) at different locations, e.g., *elisabethae*

Loss of color is often an indication that the substrate pH is too high. This is seen in many of the high humidity African species when planted in standard potting mix.

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