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MICROCLIMATES, or tipping the scales in COLORADO Cactus gardens

Existing and Engineered

Considering the vast number of cacti and succulents in the deserts and arid lands of our planet, cultivation of them in our own borderline desert backyards, is relatively a horticultural frontier.

If you've lived in Colorado for even just a year or two, you know the extremes our climate has in store. Within a year, a season or often in a day's time, the temperature will swing so wildly; you might wonder if the Earth's axis has shifted. Growing up here along the front-range, I remember hearing so often, "If you don't like the weather in Colorado, just wait ten minutes".

"Cold-hardy."….. cold-hardy? Hmm. With time, the term "cold hardy" has become increasingly nebulous to me, often, it is applied to species rather loosely, without due consideration to other dependant variables within the plants environment,

To me, it often seems meaningless and a bit deceptive; though, as I speak, I must plead "guilty", that in my reckless enthusiasm to share the success of one or two seasons with a species or cultivar, I blurt out, "Yes, sure, it's cold-hardy." My endorsement was likely to lead someone to lose time, money, hope in future efforts, or personally, not the least, their faith in me.

"Cold tolerant" is a safer term. It doesn't seem to hold the absolute promise that "cold-hardy" does, though still absent, is the addressing of equally determinant factors as air temperature. Cold tolerant implies that a plant has a quality of adaptability to our fickle climate, when affected by the manipulation of these key environmental variables. I've had success with many cold-tolerant succulents, by working with the ingredients of site, soil, sun, shelter, drainage, mulch, and numero uno, ROCKS, Rocks and more rocks. I am a member of the Colorado Cactus and Succulent Society, and compared to many CCSS veteran growers, I'm a…well, a green horn (that's horn, not thumb), this being my tenth season of growing succulents outside. I admit to being a hopeless cactophile who loves to "push the envelope." And after all, with thousands of species and subspecies to work with, and considering that many promising species have not been tried along the Front Range, many of us are finding this a new frontier, presenting a challenge too exciting to resist.

I have divided my garden into three microclimatic sections.

One is an area away from my house. It is engineered to boost the climatic zone by using rocks, vertical terrain, surrounding plants, super porous soil, tailored for each plant, but overall consisting of 50-80% aggregate, usually crushed pumice (Scoria). The honeycombed nature of scoria, has the added benefit of insulating the roots and plant when used as mulch.

Another section is against the south-facing wall of my home. Its terrain is engineered much like the first section, but with a stronger emphasis on layering and terracing, rising about 4 vertical feet, in the 10 horizontal feet, from the sidewalk to the house. This section benefits from the stored, radiating heat, courtesy of the dark brick facade. The upper two feet or so against the house, rise just high enough to enjoy el sol, even on the Winter Solstice, the years shortest day, and as low in the South that the sun will dip.

The two-story structure also provides a "precipitation shadow" from storms coming out of the North and Northwest.

The third section lies within a homemade Quonset-hut style cold frame. My cold frame has a pulley system enabling me to roll up the wall of plastic on a PVC conduit framework. This area functions as a nursery to propagate plants, which I will try in the other two areas, and let's me pretend that I live in zone 7 to 8. I completely disassemble rockwork, from the adjoining section. I reassemble it in mid-October; however, the front of the structure is rolled up to expose these plants, if the Temperature is 20 deg. F. or warmer. This insures that these plants harden off, go dormant, and makes them more suitable as outdoor specimens. Every year, I'm awed by the huge increase in species that this relatively simple, and inexpensive effort allows.

The Colorado Front Range is primarily a borderline desert. And since there are also borderline species, our task is to tip the scales by manipulating the variables mentioned,

First, take advantage of our climate by choosing an area that is already somewhat of a microclimate and expand on the qualities that make it favorable. Consider how much sun it receives in the summer and in the winter. Keep in mind that the angle of a slope and the rocks will determine how much of the sun's heat is absorbed by the soil. Since most of our wind and weather systems come from the west and the north, pick a site that's protected by a rock, a mound, structure, or another plant. Situating your garden on the south, east, or southeast side of your home is ideal.

I think the word I hear most in reference to growing cactus and succulents is *"drainage"*, and rightly so. Wet roots in freezing temperatures, reduces the cold tolerance of a plant in a huge way. I've found you can't use most desert soil along the front-range, and expect it to suffice, unless used in steep areas, or amended beyond recognition. Since we get more moisture, our soil has to drain proportionally that much faster than the plants indigenous area. So, use lots of aggregate of varying sizes. "high and dry" is the idea. Designing your garden with a lot of vertical dimension to its profile, helps with drainage too.

With regard to your growing medium, You're in the majority along the front range, if your sub-soil has the curse of being largely Bentonite, or Colorado clay. This gummy matter will do just "that" to your drainage. It'll gum it up so, that it won't matter how much aggregate you mix in
start from scratch, or rearrange it, so it slopes, then use it to anchor your larger rocks and the foundation material you may use, such as cinder blocks. How deep, will depend on how much you build up, and/or how sharp of a slope your garden surface has. Ultimately, you will find yourself fine-tuning the soil around each plant, as you learn their particular

likes and dislikes.

The use of rocks cannot be emphasized too much. I don't mean the size of rock you can pick up with one hand either. We were blessed along the Front Range with outcroppings of an ancient seabed that under pressure became metamorphosed sandstone called the "Fountain Formation" or "flagstone." It's durable, beautiful and it cleaves into nice clean plates it's an ideal stone for building a cold-tolerant garden, functionally, for ease in construction, and for pure aesthetics. Veneer rock, is lichened rock that has been exposed to the elements at the surface of formations. This is a beautiful, natural touch to a rockery and is available along the front-range. This is not readily, a renewable resource and as garden rock becomes more popular, it is reflected in the price per pound, every year seemingly near double, the previous.

Most people aren't aware of needs of the miniature gardens of lichen on veneer rock. They need very much the same conditions of light and moisture that they received in nature. It has been found in recent years that lichen health is an excellent indicator of environmental pollutants. They don't well tolerate our chlorinated, fluoridated city water. Several years of watering will be their last. This is another great reason to have a garden that will thrive on the areas average yearly precipitation.

Cacti and other succulents love to grow in nooks and crannies. If you arrange slabs of flagstone at a steep angle like the flatirons and alternately layer them with soil-mix, leaving about half of the slabs under ground, you have created solar collectors that transfer heat into your cactus bed. They also provide excellent drainage, give protection from bitter winds, and create lots of those nooks and crannies cactus find so hospitable. I use slabs of flagstone in a step like fashion of tiers against the south side of my brick home to create the warmest and driest climatic zone. This series of permanent trough gardens, provide more plantable
do not hide behind one another.

By orientating my garden against the south or east side of a tall structure in this case, my house I have effectively placed it in a rain/snow shadow. This means that if I have a plant that is especially rot prone, it will benefit from the low moisture situation I've created.

Drought tolerant evergreen ground covers and grasses also have proven invaluable for me in many situations. They provide insulation and take up excess water when we're in the monsoon patterns of mid-summer. Many of the promising genera, like Gymnocalycium are native to grassy plains and depend on filtered light and other beneficial traits provided by neighboring flora.

I recommend a buffer zone of scoria or other angular one-quarter inch gravel placed an inch or so depth and an inch or more wider than the diameter of the plant at the base of each, to discourage alien root encroachment and crown rot. While many types of gravel are fine, I use scoria (pumice) of varying sizes almost exclusively as the aggregate in my soil mix, for a number of reasons. Like perlite, it's porous. Roots love it. You would think it would soak up water like a sponge, but it drains readily. I believe the major benefit to the plants in cold weather is the minute air-filled cavities. Like air-filled Styrofoam, it does not conduct cold as would a solid pebble. Not only does it insulate the

roots, but it can be used effectively as a mulch to pile around the stem during the winter months.

I don't call the exotic species listed below cold-hardy. They have tolerated three or more Colorado winters, using the aforementioned control techniques. They are almost exclusively low profile plants except for several Echinocereus and the Trichocereus. I am convinced that among the thousands of species out there, many are anxiously waiting, twiddling their spines and tapping their roots, for the chance to audition in our gardens and call Colorado home.

The extent you go to in planning your garden, all depends on how much you want to increase the number of species to enjoy in your garden No matter to what degree you delve into the fascinating array of desert flora, your efforts will be handsomely rewarded.

Some genera and species of cacti and other succulents in my garden that have survived 3-10 winters are:

AGAVE

Toumeyana v. bella

Lechugilla

Parryii

Havardiana

Scabra

Neomexzicana

YUCCA

Brevifolia

Faxoniana

Thompsoniana

Rupicola

YUCCA cont.

Flaccida

Glauca harmaniae

Aloinopsis

Hilmarii

Spathulata

Luckhoffi

Schoonessi

NANANTHUS species

ACANTHOCALYCIUM

Spiniflorum aka violaceum

GYMNOCALYCIUM

chubutense
gibbosum v nigrum
quehlianum
Baldianum
Vatteri
Gibbosum
- Bruchii
- Calcochlorum
- Calcochlorum v. proliferum

Multiflorum

Pyrrhocactus

strausianus

bulbocalyx

PEDIOCACTUS

Simpsoni
Nigrispina
Bradyi ssp.despainii

knowltonii

THELOCACTUS

rinconensis
bicolor v bolansis

TURBINOCARPUS

Valdezianus

Echinocactus,

texensis

ECHINOCEREUS

Reichenbachii
reichenbachii v caespitosus
Pectinatus v. Rubrispinus
Dasyacanthus
Engelmannii
Knippelianus
Viereckii v. morricalii
adustus
fendleri v kuenzleri
polyacanthus
rigidissimus
reichenbachii v perbellus
reichenbachii v baileyi
Coccinea
Triglochidiatus several varieties + sub-species
viridiflorus group
Cloranthus
Russanthus

NOTOCACUS

mammulosos v albispinus
submammulosus

REBUTIA

Densipectinata
Pygmaea
steinmannii v costata

CORYPHANTHA

poselgeriana
Obscura
Echinus
Echinoidea
Scheeri
Sulcatta
Macromeris
micromeris
Minima
Runyonii
Vivipara
runyonii

ESCOBARIA

Leeii
Sneedi
Chihuahuensis
Albicolumnaria

Trichocereus

huascha