

How to Fertilize Cycads and Succulents

Maurice Levin, Jurassic Garden

[Cycads](#) and [succulents](#) are increasingly popular garden plants because of their distinctive and architectural beauty their drought-resistance and, in the case of cycads, the intrigue of owning a “living fossil”. Cycads like the [Sago Palm \(Cycas revoluta\)](#), plus more rare [Cycas](#), rare [Encephalartos](#), and rare [Dioon](#) species are finding their way into upscale landscapes. Succulents like [Aloes](#), [Agaves](#), [Echeverias](#) and [Crassulas](#) have amazing colors, geometric symmetry and an often incredibly "non-plant-like" appearance. When given proper care, cycads and succulents are stunning [landscape features](#). And, though cycads and succulents may *look* similar to other plants, their fertilizing needs are very different from other tropical looking and exotic plants.

To be attractive and healthy landscape plants, cycads and succulents need the right soil and fertilizer. You'll want to provide good drainage, and improve your soil with necessary nutrients your soil and water are missing.

The [Western Fertilizer Handbook](#) shows 16 Essential Elements for healthy plants in the chart to the right:

So, what should we add to our soil?

1. Plants get enough hydrogen, oxygen, and carbon (dioxide) from air, water and sunlight. So, no problem there.
2. The remaining necessary plant nutrients come from the soil, and what we add to it.
 - a. Primary nutrients: nitrogen, phosphorous, and potassium.
 - b. Smaller amounts of calcium, magnesium, iron, and sulfur.
 - c. Finally, smaller amounts of micronutrients copper, manganese, zinc, boron and molybdenum.

If your soil and water don't have enough of the above elements, you'll want to add them to your plant's “diet”.

For 15 years, we've tested numerous fertilizers in our nursery and in clients' gardens to find the best way to augment healthy cycad growth. Through trial, error, reading, and seeing good results and bad ones, we've discovered a few key ways ways to amend soil to grow healthy cycads, succulents and other drought-resistant plants.

Growers face a number of challenges to nurture beautiful and healthy cycads and succulents:

1. Alkaline soil can prevent plants from absorbing nutrients
2. Alkaline water distributed by utilities can prevent plants from absorbing nutrients
3. Cycads (and succulents) have special nutritional needs, different from other plants

Alkaline Soil and Waters

The pH scale measures if something is acidic or alkaline (basic). It ranges from 1 (highly acidic) to 14 (highly alkaline), with 7 being neutral. An increase or decrease of one point equals a multiple of 10, so 8 pH is ten times the alkalinity of 7 pH. Rain water pH is slightly acidic, generally 5.5-6.0. **Most garden plants prefer a pH of 5.5 to 7.**

Arid regions usually have basic soil, with higher alkalinity and salts, lower in iron and organic material. This is a problem for many ornamental plants. High organic content generally creates healthy living soil that grows strong, pest-resistant plants, with a slightly acidic pH. Arid climate soils, without organic or other amendments, typically range from 7.5-8.5 pH. This is 5 to 500 times more alkaline than 7 pH.

Sixteen Essential Elements

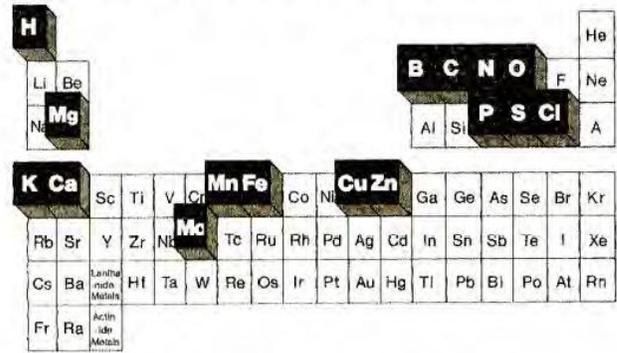
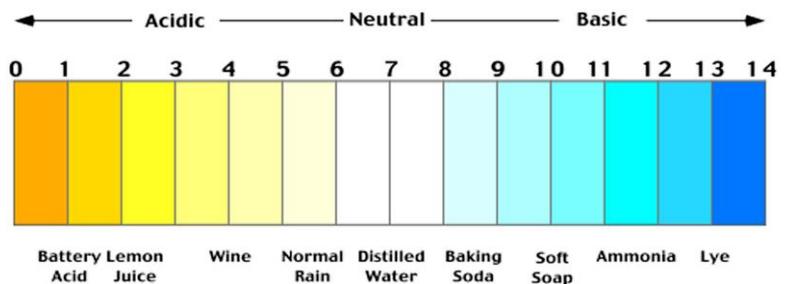


Fig. 4-1. Periodic table of elements highlighting the 16 essential plant nutrients.

• H – Hydrogen	• Cl – Chlorine
• B – Boron	• K – Potassium
• C – Carbon	• Ca – Calcium
• N – Nitrogen	• Mn – Manganese
• O – Oxygen	• F – Iron
• Mg – Magnesium	• Cu – Copper
• P – Phosphorus	• Zn – Zinc
• S – Sulphur	• Mo – Molybdenum



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Alkaline tap water predominates in the USA. This is because water utilities add ingredients to increase water alkalinity, to reduce water's corrosiveness, and to prevent heavy metal leaching into drinking water, "red" water and water nitrification. For example, Los Angeles tap water ranges from 8.0 to 8.5 pH, according to the L.A. Department of Water and Power.

The graphs below from the Western Fertilizer Handbook, shows how alkalinity prevents plants from absorbing nutrients (and fertilizer) in soil. Not, on the left, that "Nitrification," (how Nitrogen in soil feeds plants), is best at 5.0-7.0 pH. Based on this graph, in typical Los Angeles soil and water, plants receive Nitrogen at one-fifth the rate they would if soil pH was "normal." The second graph shows how high alkaline (basic) pH denies your plant most other key nutrients, as well. So, if you have typical soil and tap water, and you add a typical fertilizer, it's like trying to stir sugar into a cup of iced tea. Like the sugar not dissolving, your plant simply can't get the nutrients!

Relation of Soil pH to Nitrification

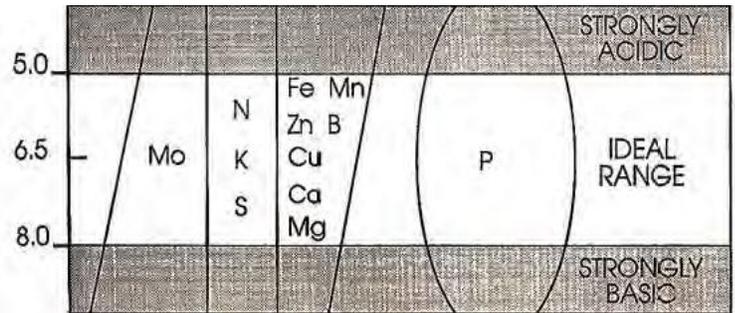
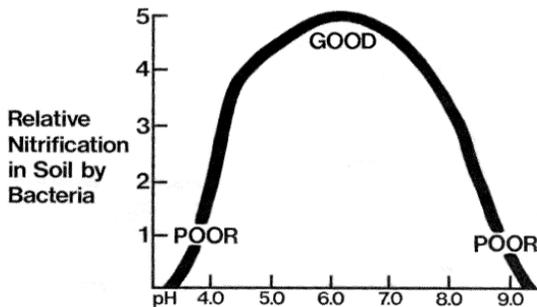


Fig. 1-5. Relative mineral nutrient availability as affected by soil pH.

Help Your Plants "Pump Iron"

Iron (Fe) is another key nutrient for succulents and cycads, less available in alkaline soils (above 8.0 pH). African cycad and succulent habitat photos show dark orange/reddish-brown high iron soil. And though cycads and succulents love iron, dry climate soils and municipal water tend to be low in iron. Look at the "Red Dirt" these cycads in Hawaii and South Africa are thriving growing! Growers there often scoop ground soil and use it in potting mix (see photos below).



Hawaii



South Africa

Organic Mulch is Key

Using organic mulch, and organic compost can help offset alkaline soils' organic material deficiency and neutralize soil alkalinity. They also feed your soil, so the soil can feed your plants naturally. Organic mulch also moderates soil temperatures, lowers water loss from the soil, and encourages beneficial microorganisms that help plants grow.

Your Fertilizer: Organic vs. Inorganic, Soluble vs. Insoluble

While organic mulch and compost can offset soil and water alkalinity, the right fertilizer can further improve succulent and cycad growth. Organic fertilizer has several advantages over chemical fertilizer

1. It improves soil structure and increases soil's ability to hold water and nutrients
2. It's renewable, biodegradable, sustainable, and environmentally friendly, and
3. Over time, it feeds your soil as well as your plants

Historically its key drawback has been that it releases more slowly than chemical fertilizers.

Chemical fertilizer, while often quickly available to plants, has the following drawbacks:

1. It's an "artificial additive" which feeds the plant, but not the soil.
2. It leaches away from the plant, requiring additional applications

3. It does not build soil health, but rather, used exclusively, it tends to degrade soil, deplete nutrients, and add unhealthy salts and other chemical residue
4. Long-term exclusive use can negatively affect soil pH

So, the big challenge is to feed your soil sustainably to grow healthy [cycads, succulents and other drought-resistant plants](#), and have a soluble nitrogen source that's quickly available to plants. The good news is that over the past several years, advancements have been made that enable largely organic fertilizers more quickly soluble and available to plants.

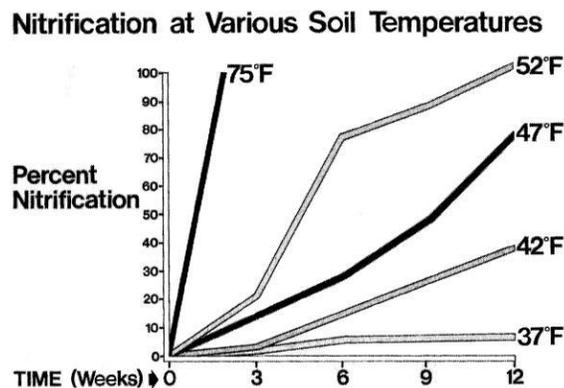
Don't Panic, Go Organic

Ultimately you'll want to fertilize your cycads with nutrients from largely organic and (and limited chemical) sources to accomplish the following:

1. Reduce your soil and water alkalinity, short-term and long-term, Organic fertilizer feeds the soil, not just the plant, and provides for long-term plant growth.
2. Add necessary iron which is absent or unavailable in most soils
3. Add organic material (mulch and compost) for the soil's and plants' long-term health
4. Provide a combination of nitrogen sources, organic and chemical, soluble and insoluble, to give the plant its necessary fuel for growth and while also feeding the soil

When to Fertilize?

Finally, regarding when to fertilize, here is another graph from the Western Fertilizer Handbook:



If you fertilize when it's cold outside, nitrogen takes much longer to get to your plants, and may have dissipated by the time the soil is warm enough to feed your plant(s). Remember our "iced-tea example" above? So, wait until outside temperatures average in the 70's for a couple of weeks before you apply fertilizer. Then, apply fertilizer again in mid-to-late summer, and perhaps once more in early-to-mid fall.

I wish you the best growing success.

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P.S. Feel free to [visit our website to learn more about the fertilizer we developed to grow healthy cycads and succulents](#).

Thank you to Glen Williams, who augmented this information and made it more clear and readable.

Sources for this article include:

[North Carolina Department of Agriculture & Consumer Services](#)

[Western Fertilizer Handbook](#)

[Seattle Public Utilities](#)

[Illinois Department of Public Health](#)

[Florida Water Resources Journal](#)