Growing Vegetables in Containers
In the Valley of the Sun

Most people think of vegetable gardens as miniature farms—big patches of soil with crops in rows and furrows! It doesn't have to be that way, and in the desert, that isn't even the best way. Where there isn't much room, or the soil is just impossible, it's often best to grow vegetables in containers. Here are some tips for raising great edibles in the desert:

Choose the Container

Growing containers can be of many different materials. The best is unglazed terra cotta, because it allows water to evaporate from the sides, cooling the roots and allowing extra oxygen into the soil. Drawbacks include more frequent watering, moderate expense, high weight, and a tendency to flake away from salt buildup after 3-5 years.

Glazed pots, especially stoneware, use less water and last much longer, but don't provide any cooling or aeration. They also tend to be more expensive, and they are just as heavy.

Concrete pots work like glazed pots, are less fragile, but are even heavier. On the other hand, some vegetables need a lot of root room, and concrete pots are often the largest available.

Wooden containers should be made of rot resistant woods, such as cedar or redwood. Avoid pressure-treated wood, because it contains arsenic! Wood allows little or no evaporative cooling, but it does provide some insulation from temperature extremes, and a little aeration between the joints. Wood features moderate watering, moderate to high expense, moderate weight, and low to moderate longevity (depending on the quality of wood and binding materials used).

Plastic pots can be the most economical alternative, and are often the lightest, as well. Plain, straight plastic holds water well, but provides no cooling, insulation, or aeration. Most plastic pots suffer *sun rot*, where the plastic becomes discolored and brittle from the ultraviolet in the intense Valley sun, and may only last a year or two here. Black plastic suffers the least, because the black pigment absorbs ultraviolet, but lighter colors reflect heat better, reducing stress on the roots. Foam plastic pots are generally more expensive, but they provide good insulation for the plants roots, and are less affected by sun rot.

Some metal containers can prove useful, with a few caveats: copper, brass, or bronze containers will kill any roots that contact the metal; lead, pewter, or pot metal containers can make the vegetables toxic; and bare steel or aluminum containers rust away quickly. Galvanized or stainless steel containers can hold vegetables, but any metal container provides the least insulation of the materials available. Usually, a metal container works best as an ornamental facade for an inexpensive plastic pot inside.

The size of the container is also an important point. Most vegetables do best with about 12-18 inches of soil depth. Members of the squash family—cucumbers, melons, gourds, and squash—need about 18-24 inches of soil depth. Some of the smaller root and leaf vegetables—radishes, short carrots, bunching onions, spinach, mezclun, etc.—can get away with only 8-12 inches. Horizontal dimensions depend on how many of what kind of vegetables you are planting: a 2 ft. x 2 ft. tub will hold one melon plant, or 3-4 tomato plants, or dozens of radishes!

Whatever kind or size of container is used, it must have holes in the bottom to allow excess water to drain out! Lack of drainage is bad news for vegetables, causing a poor harvest from salt buildup at best, or a quick death from root rot at worst. If possible, let the container drain freely out the bottom—saucers are only to protect the surface underneath. If a saucer must be used, either move the pot to water it, then return it once drained, or hold the pot *above* the saucer with bricks or pot feet, and/or empty the saucer 15-20 minutes after watering (a cheap bulb baster is handy for that). "Self-watering" containers seldom cause root rot, but salt buildup often is just as bad, unless watered consistently with distilled or reverse osmosis water—which often isn't practical!

Choose the Soil

Usually, it's easiest to just use one of the many pre-mixed, bagged potting soils on the market. Be sure to use something actually labeled "Potting Soil"! Materials labeled "Planting Mix", "Compost", "Soil Conditioner", or "Topsoil" frequently aren't the right texture, composition, or nutrient content to make good potting soil, especially in the heat of summer. Good mixes include Black Gold All Natural Potting Soil, Black Gold CocoBlend Potting Soil, Sunshine Mix, or Whitney Farms Uncle Malcolm's Blend. Cheaper, heavier potting soils can also work if caution is exercised in watering. For massive quantities, it may be cheaper to make your own mix. Here's a recipe for a useful potting soil:

By volume:

1 part composted steer manure

1 part sand

1 part pumice

4 parts Berridge Compost

Plus 2 Tablespoons of Berridge Rose Food per cubic foot of total materials

Moisten slightly to hold down dust and mix *thoroughly*. Fill the pots and water thoroughly twice, then let dry before planting.

Alternatively, many places that sell bulk landscaping materials also offer potting soil by the cubic yard (27 cubic feet). Be sure to see what you are getting before arranging delivery!

Planting

Choose **what** to plant, according to the time of year, from the attached Vegetable Planting Guide. **How many** to plant will depend on the size of the container, how big the plant grows, and how well it can stand crowding. For instance, most cole crops—broccoli, cabbage, etc.—don't like to be crowded, and need at least a square foot of soil each. The exceptions are the various kinds of mustard greens and collards, which can be planted as little as 4 inches apart. Here are some lists of typical spacing for vegetables in pots:

Close spacing (4-6 in.): radish, carrot, leaf lettuce, bush beans, mustard, collards, chard, spinach, endive, bunching onions, herbs, turnip greens, garlic, arugula, and shallots.

Medium spacing (8-12 in.): tomato, pepper, eggplant, tomatillo, cabbage, cauliflower, bok choy, broccoli, brussels sprouts, celery, kale, kohlrabi, head lettuce, okra, bulb onion, peas, escarole, radicchio, strawberry, and turnip root.

Wide spacing (16-24 in.): artichoke, sweet corn, cucumbers, melons, potatoes, pumpkin, and squash.

Small plants are the most common way of starting a garden these days, though some things, such as root crops, still do much better from seeds. When planting transplants, most vegetables prefer to be planted no deeper than they were in their starting pot—always leave about ¼ inch of the original root ball showing above ground. The main exceptions to that rule are tomatoes—which can be planted 6 inches deeper than originally, for a bigger root system—and the larger members of the cabbage family—which can be planted 3 inches deeper, to help hold them up.

As a rule, plant transplants into moist soil (not soggy) and water **thoroughly** afterward, to collapse any air pockets and leach out any excess tannins. A good root stimulator, such as Superthrive, and a weak dose of liquid fertilizer are good things to add at the end of the first watering. Plant seeds into thoroughly watered soil, water lightly 2-3 times a day until they sprout, then gradually wean them back to their regular watering schedule. Also, timed-release fertilizer (see below) works best if it is worked deep into the soil before planting.

Watering

The goal in watering any plant in a container is to saturate the soil, and then allow the excess water to drain out, until the soil is at *field capacity*. That means that the water is sticking hard enough to the soil particles to keep gravity from pulling more out through the drainage holes, but the film of water around the soil particles isn't so thin as to keep the roots from soaking up their share. Field capacity is the ideal balance of air and water to allow maximum root growth and function. When the soil dries up enough, the roots can no longer pump enough water to support the leaves, and they wilt. Remember that **wilting equals damage**! Wilting slows growth, damages flower buds, and hampers nutrient absorption. Ideally schedule your waterings so that the pots can drain, but the plants don't wilt—**water before wilting**!

When watering, apply enough water—preferably in one shot—to allow some water to drain out the bottom of the container. With a hose, sprinklers, or a watering can, that usually means about one inch of water for every foot of soil depth. With a drip system, set the emitters to provide one gallon of water for every five gallons of soil, fast enough to cover the soil surface. Not allowing water to drain out—as with no drainage holes, not enough water at a time, or letting the saucer (if present) to stay full—can lead to salt build-up at best, or root rot at worst.

If water drains out **instantaneously**—say, before the watering is finished—there may be open channels in the soil, or the soil may have shrunken away from the sides of the pot, allowing the water to bypass the roots entirely. If that happens, try watering, then letting what water did absorb to diffuse and swell the soil for a half hour or so, then water again. If necessary, repeat four or five times, until the soil is soft and heavy with moisture. In the worst case, when channels have been eroded from the soil surface to the drainage holes, repotting may be necessary.

Watering schedules will vary somewhat, depending on the plant, the size of pot, the kind of soil, the temperature, and the humidity. Since no vegetables are particularly drought tolerant, that usually means watering every 1-3 days in the winter, and 1-3 **times** a day in the summer. Soils that hold water longer, such as CocoBlend, can reduce watering frequency, but are frequently fine textured enough to reduce the amount of oxygen in the soil, risking root rot on some plants. The jury is still out as to whether water holding soil polymers are safe to use on vegetables. Allowing the soil to dry out—just a little bit—between soakings allows extra oxygen to reach the roots, and helps prevent a number of fungus diseases.

Feeding

Because of the porous nature of potting soils, and the frequent watering container plants need, regular applications of plant nutrients is a must for healthy and productive vegetables. Vegetables, like all fast-growing plants, need a steady source of such elements as nitrogen, phosphate, and potash; as well as smaller amounts of iron, zinc, manganese, and a dozen or so other *micronutrients*. These nutrients can come in either an *organic* form, or a *chemical* form.

Organic fertilizers were the first to be used a few centuries ago, when scientific farming first began to take hold. They are natural materials as they are taken from fields or mines, usually with just enough processing to facilitate packaging: manures, animal and plant processing waste, raw minerals, or powdered rock. On average, organic or natural fertilizers are low in actual nutrient content, slow acting, and sometimes expensive. On the plus side, they feed the natural soil organisms that help to maintain a healthy root system, and often contain natural plant hormones that stimulate growth and improve disease and stress resistance.

Chemical fertilizers are synthetically produced to provide concentrated doses of the chemicals that the plants actually absorb through their roots when natural sources of nutrients are broken down by soil bacteria. They are normally quick to give results, and quick to wash out of the soil, except for the various slow- or timed-release forms. Usually, they are less expensive for the amount of nutrents they provide, although that is becoming less of a factor as the cost of energy—used to drive the chemical reactions—spirals upward. Chemical fertilizers tend to accelerate the decay of the organic content of potting soils, occasionally causing the collapse of the soil structure, which leads to drainage problems. On the plus side, they are easy to apply and can give a quick fix for nutrient deficiencies.

Nitrogen, the first of the major plant nutrients, is a building block of all the proteins in the plant: growth and metabolism can't occur without it! Nitrogen deficiency usually shows up in slow, spindly growth with tired, yellowish green foliage, especially the older leaves. That can often affect fruit formation, since fruiting vegetables form flowers on new growth. No new growth, no tomatoes, peppers, or peas. Organic sources of nitrogen are animal manures, blood or fish meal, or cottonseed or alfalfa meal. Chemical sources include ammonium sulfate, ammonium nitrate, or urea. Most commercial fertilizer blends have several sources of nitrogen, and the total amount (percentage by weight) is shown as the first of the three numbers that appear on the package, with a more detailed breakdown appearing in the **guaranteed analysis**.

Phosphate shows up as the second number