A WORD OR TWO ABOUT GARDENING

In Miami-Dade Think Raised Bed Gardening

With fall fast approaching it is not too early to be planning your vegetable/annual flower garden. If you are new to gardening in Miami-Dade the warm/cool dry months from late fall to early spring are when vegetables and colorful annuals become the focus of attention for so many local gardeners. One chore that can be especially onerous is preparing the ground for planting, since native Miami-Dade soils are porous and contain little organic matter. This means incorporating organic soil amendments into the soil well ahead of the time you plan to sow seed or set out transplants. In addition few areas of the county have tillable soil, so for most this means contending with concrete-like Miami limestone. Local growers use a special rock plough to break up the ground. This of course is not an option for homeowners, but there is a simple far less strenuous alternative to wielding a pick axe. Install one or more raised beds. Bearing in mind the increase in zero-lot housing in Miami-Dade, this offers one other important advantage. Raised beds permit economical use of limited space.

There are further advantages to raised beds:

- ♦ It is easier to replace depleted soil and avoid a build up of soil borne disease and plant parasitic nematodes.
- ♦ Raised beds lessen the risk of soil becoming water-logged in areas with poor drainage (marl locally) and can improve air circulation around plants.
- ♦ For those with limited mobility a raised bed can make it easier to cultivate a garden.
- ♦ Since foot traffic is lessened, soil compaction and accidental damage to plants is reduced.

There are only two features that may cause some to hesitate before constructing a raised bed. The first is cost, though of course this depends on how the bed is constructed. The second concerns loss of soil moisture through the sides of the bed, thereby necessitating increased watering compared to planting directly in the ground. Mulching and/or installation of a simple drip irrigation system will largely alleviate this problem.

Before discussing what materials are available to construct a raised bed, some consideration needs to be given as to **placement in the yard**. For **vegetables that produce a fruit** (e.g., tomatoes, peppers and squash) maximum sun exposure (8 hours per day) is needed. **Leafy green vegetables** do not require as much sun exposure; 6 hours per day should suffice (even less for cabbages and collards). **Bedding plants** such as begonias and impatiens can also take some light (dappled) shade, while others (e.g., marigolds, salvias, cockscomb and blanket flower) require full sun. Determine present and anticipated **shade** from structures and landscape plants, existing or contemplated (a solid wooden fence, a tall hedge as well as neighboring trees and shrubs). Nearby trees can also pose an additional problem since surface roots can grow up into the raised bed.

The simplest type of raised bed consists of a flat mound of soil with a retaining wall of rock and rubble. Such a system lacks durability, thereby limiting the height of the

bed, and the soil is apt to wash out through the bed walls. To effectively retain soil within the raised bed requires construction of a bed wall using building materials able to provide far greater physical integrity. **Untreated scrap wood** can be used if the bed is temporary, otherwise expect wood to decay within 12 months under local conditions – optimum temperature for wood rot 68 - 95°F. Some types of natural lumber, such as redwood or red cedar heartwood, exhibit greater resistance to decay and are widely used for above ground decorative purposes. Resistance to decay is markedly reduced where there is direct contact with wet ground. Wood of this type displays natural variability in durability, but of more concern is the cost which is as much as twice that of pressure treated wood. First growth cypress wood exhibits excellent resistance to decay and insects, but is of limited availability.

Pressure treated lumber is exposed to a wood preservative in a pressurized chamber to ensure deep penetration of the preservative into the wood fibers. Much controversy developed over the use of one commonly used preservative, CCA (chromated copper arsenate) because of the potential for contamination of soil/groundwater with arsenic. The issue is no longer moot since the **EPA withdrew CCA treated lumber for residential use** in 2004 (it is still available for certain construction, marine and agricultural purposes). **Two copper-based wood preservatives have for now replaced CCA** in the manufacture of pressure treated lumber for outdoor residential use: **ACQ** (alkaline copper quat.) and **CA** (copper azole). Use of these two preservatives requires retention of up to 90% more copper in the wood compared to CCA, the actual amount depending on the intended end use. Where there is direct contact with the ground (i.e., a raised bed) you will need to use wood with either 0.4lbs or 0.21lbs per cubic foot of ACQ or copper azole respectively. A tag with the level of preservative retention should be found stapled to the ends of each length of lumber.

Micronized copper quat (**MCQ**) treated lumber is replacing ACQ – it is the only wood preservative certified not to release copper that could in any way adversely impact the environment. The main drawback to using lumber containing theses increased levels of copper (especially ACQ) is rapid corrosion of fasteners (screws, nails and bolts) and connectors (corner braces). For this reason it is essential to use hot dipped galvanized fasteners and stainless steel or copper corner braces when constructing your raised bed. Enquire at local lumber yards which type of pressurized wood they stock - some manufacturers offer wood that has also been treated with a water-repellant (this reduces subsequent warping and cracking of the wood). **Borate treated lumber** is available but with present technology it is not suitable for outdoor use. Since borate, unlike copper, does not bind to wood fibers, it is readily lost once the lumber contacts water. Borate is potentially toxic to plants.

If you are uncertain about pressure treated lumber, especially questions surrounding corrosion, consider **synthetic wood**. In addition to not having to bother about using the most expensive fasteners and connectors, these products offer a number of other advantages. They exhibit excellent resistance to decay and wood boring insects, and are environmentally positive, containing 50-100% recycled plastic (some also contain waste wood fibers). Unlike wood, synthetic lumber will not crack, splinter or warp, does not require application of a sealer, but can be worked like regular wood. It lacks the

load bearing strength of natural wood, but for a raised bed this is not important. The main **disadvantage to synthetic wood** is cost, which is considerably more than pressure treated lumber or masonry (see below). Stability of plastic under south Florida's intense UV radiation could be a concern – premium products should be manufactured with UV stabilizers. Pre-machined synthetic wood is available, often sold as ready to assemble raised bed kits. Synthetic lumber, particularly if purchased as a **raised bed kit**, is a good option for those with very limited space who wish to grow a few fresh vegetables or add some colorful bedding plants to a patio garden. Although comparatively expensive, kits offer ease of assembly with minimal use of tools. Some kits are expandable, but bed height is often restricted to 12". Kits that use spiked plastic corner pieces to hold the bed in place are impractical in areas of Miami-Dade where there is limestone with little depth of soil.

Masonry for raised beds is available as cut stone, brick or pre-cast concrete blocks with product suited to meet a wide range of budgets. All of these materials offer excellent permanency, and are very economical if ordinary pre-cast concrete building blocks (cinder blocks) are used. For a large raised bed (high school or community garden) **cinder blocks** are an especially attractive option. Where aesthetic appeal is important (ornamental bedding plants) more expensive landscaping masonry is available with an attractive natural stone finish (e.g., Matt Stone or Anchor wall). The one **disadvantage to using masonry** is the need to have a perfectly level surface in order to align the blocks without gaps. Where beds are constructed using three or more courses of cinder blocks, stability becomes a concern and it is recommended that the first course of blocks be sunk at least 3" in the ground on a bed of compacted sand. Mortar is also advisable, essential if the retaining wall exceeds three courses or if the top is be capped with timber or plastic to provide seating.

To construct the raised bed first decide on its' **size** and clear the ground of existing vegetation (grass, weeds etc.) and rake out any loose stones. For ease of cultivation the bed width should be no more than 4', while the length will depend on what is to be grown and the space available. For a large community garden a 4x25' bed provides a 100 sq ft planting bed and eases calculation of fertilizer application and irrigation needs. If you do not have sufficient space for a long bed, construct one that is T-shaped or in the form of a Greek cross. **The height** of the bed is dictated in part by what plants are to be grown and who will be tending them. For most purposes a bed wall of 12 – 24" will be adequate. For a children's garden a bed height near the lower end of this range is satisfactory, while for those with limited mobility a bed of up to 3' permits greater accessibility.

When using either **synthetic or pressure treated boards** to construct bed walls remove a 4" wide strip of soil/rubble to a depth of 2-3" to form a rectangular shaped base. Pre-drill the ends of each board and attach them to each other using stainless steel or galvanized metal braces. Do not use nails as this can easily split pressure treated lumber, however self-tapping screws can be used on synthetic wood without the need to pre-drill. Use galvanized tacks to attach landscape fabric to the inside walls (just below intended soil line) to aid soil retention. Place a 3-4" strip of ¾" drain-field aggregate along the inside base of the bed wall to hold the fabric in place. Compared to

board wood, **beams** are heavier squared lengths of timber available as both synthetic and pressure treated wood, stacked length ways to the desired height of the bed wall. The bottom coarse should be set in a shallow trench (2-3") with a base of compacted sand to smooth out any bumps. **Stack the beams** in an off-set pattern so that the corners resemble an outsize mortice and tenon joint. You should drill holes starting about 6" from the end of each beam at 2-3' intervals, aligning the holes as the beams are stacked. Once the beams are all in place insert lengths of rebar into the aligned drill holes, pounding each into the ground.

If you decide to use **cinder blocks** lay the first course of blocks on a 1" deep bed of compacted sand in a 2-4" shallow trench. Tamp down and align with a spirit level. Lay subsequent courses in a staggered pattern with rebar driven into the ground at each inside corner. If you use mortar leave drainage holes above the first course of blocks and cover with landscape fabric held in place with drainfield aggregate. Some of the decorative faux stone construction blocks are keyed or grooved for added stability without mortar. It is very important to lay these blocks on an even flat surface to ensure they are correctly keyed together, and where the wall exceeds 2' you will need to use mortar.

Consider augmenting your raised bed with a **trellis or row covers**. A trellis is essential to support beans, cucumber or chayote, and recommended to keep tomatoes off the ground. Hooped trellises can be fabricated from 10 gauge, 6" square wire mesh. Make each hoop 30" wide, with 12-18" between each to allow access to plants. Hooped bamboo trellises are also available, as well as flat trellises made from wood or plastic. **For sturdier frames** use metal conduit or plastic/metal water pipe. Uprights can be affixed to the inside of wood/plastic walls with galvanized metal brackets, or for masonry walls sunk in pre-dug post holes, then connected to the top cross bar with elbow joints. Intervening cross pieces are joined with T fittings. Use string or plastic mesh rather than wire to provide the lattice work for plant support. After harvest this can be removed along with the attached plants and disposed – this is far easier than attempting to disentangle plant stems and leaves from wire mesh. If crop damage from birds is probable row covers can be installed using the mesh hoops above as a support for protective netting. Some raised bed kits offer row covers as optional add-ons.

Finally there is the **question of soil**. All the effort and expense devoted to selecting and preparing the site and constructing retaining walls will be in vain unless you use the correct soil mix. For a 10x4' bed you will need 1½ cu yd. of soil to fill to a depth of 12". There are commercially available bagged top soils specifically designed for growing vegetables and annuals, but these are intended to enrich existing garden soil. If you use one of these products mix with a 50/50 top soil, adding coarse sand if the product is too heavy. Never use black dirt or black Florida peat, they cause soil compaction and impede drainage. You can mix your own growing medium using fully cured garden compost, sphagnum peat, composted pine bark, coarse vermiculite and coarse sand (organic components should be no more than 50-60% by volume). The final product should adhere to form large crumbs when moistened – if it forms a sticky ball when squeezed add some additional coarse sand. Include dolomitic limestone; the exact

amount will depend on the soil mix but as a rough guide use 15½ lbs per cu yd of a soil mix containing 50% organic matter. Aim for a soil pH from 6.5 – 7.0.

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