

Secrets of the Amazon Gardening at 31 Dortch Ave.

How does Mary and David's garden grow? Soil is the most important component contributing to the success of this garden. The composition of the soil used in the beds is inspired by work David has done in the rainforests of South America. There, like here, soils are infertile due to weathering and leaching of nutrients over millions of years. Amazonian tribes today practice swidden fallow or slash and burn agriculture where an area is cleared and burned and the nutrients from the ashes of felled trees support crops for a number of years before the plots are abandoned and new plots established. Most nutrients in the rainforest are present in living vegetation due to high rates of decomposition and weathered soils. Archeologists have recently discovered that, prior to the conquest, a sustainable form of agriculture in permanent plots was practiced in South America. The Amazonian tribes appear to have abandoned this practice as they fled from the Spanish and Portuguese colonizers. The sustainable practice they used is termed terra preta (black earth in Portuguese), because archaeologists have found abundant charcoal in rainforest areas that do not experience fire. It has recently been determined that Amazonians would fell trees, bury them, and burn them, a process that produces both charcoal and calcined (fired) clay. These two ingredients are very useful, because they both constitute permanent amendments that improve the soil's ability to store and deliver nutrients to growing plants. Charcoal (or biochar) is unique in that it is the one form of organic matter that does not decompose over time, yet still contributes the same benefits as other forms of organic matter: the ability to store and deliver positively charged nutrient ions (principally ammonia, NH_3^+) as well as the ability to improve soil texture thereby increasing drainage, water storage, and air conduction. The heat from burning wood would also change the nature of the adjacent clay soil. Clay, when fired expands due to water evaporating from within clay particles. This causes the clay to become hard (like fired clay pots or a high quality kitty litter) and filled with numerous pores that conduct air and water. The clay also has increased surface area and it is the surfaces of the clay particles that hold positively charged nutrient ions (cations) such as calcium (Ca^{2+}) and potassium (K^+). Thus, calcined clay provides the benefits of clay's ability to hold nutrients and overcomes the problems that clay presents to gardeners by being too heavy, impeding drainage and air conduction. Calcined clay is available commercially as a soil conditioner (Profile, Turface, infield dressing, etc.) and costs about \$10 per 50 lb bag. We have not found a commercial source of biochar (does anyone have any leads?) and have substituted compost in these beds.

This garden was constructed in an area of fill dirt. Each bed was excavated to a depth of two feet. The original soil was sieved and added back to the beds in ratio of 20% calcined clay (10-12 bags per bed), 40% organic matter (compost), and 40% original soil. Approximately 6 lbs of dolomitic lime (calcium and magnesium carbonate or $\text{Ca}(\text{CO}_3)_2$ or $\text{Mg}(\text{CO}_3)_2$ was added to reduce the acidity of the beds and supply calcium and magnesium. The beds are top-dressed with new compost at least once each year.

Plants are direct sown or grown indoors before transplanting. We extend the season by covering beds with greenhouse plastic hoop houses from November-April and row covers (spun-bond polyester) May-July. This controls pests, moderates temperatures, and reduces water loss. Organic pest controls are used as is rainwater collected from the roof of the porch. Enjoy!