The Garden Plot, August 2008
By Robin Mittenthal, University Apartments Community Gardens Committee

I recently brought a cake to a friend's party, and in the course of the evening several people asked me if I had made it "from scratch" (I had). As you may know, cooking "from scratch" means to prepare food from simple ingredients (in this case, eggs, flour, sugar, etc.), rather than from a bottle or box. In an age dominated by manufactured, pre-prepared foods, the fact that I make cakes from scratch seems to elicit more than a little awe, at least in some folks.

The ability to garden or farm successfully is sort of like cooking from scratch, and those who can coax vegetables, grains, fruits, and flowers from a piece of bare ground are often similarly admired. If you think about it, however, growing food from scratch is much more problematic than cooking that way.

Let me try to explain.

In the absence of humans, nature almost never builds ecosystems (groups of interdependent plants and animals) from scratch. Instead, in most of the places you and I would want to live, there are complex, long-lasting communities of organisms that don't change much from year to year. On land, these natural systems are usually built around "perennial" plants, plants that live for many years (think trees and bushes, but also grass – some grasses can live for hundreds of years).

Perennials tend to be varied in size and shape as well as genetically diverse, which means that they play complementary roles in the community. Though we rarely see them, perennials also tend to have large, deep roots. Both the roots and the aboveground parts are present year-round, and help to protect soil from the action of wind and water that otherwise carries it away.

Thanks to the contributions of perennial plants, most natural systems are quite stable. While there are events like landslides, volcanic eruptions, or wildfires after which bare soil is exposed and communities must assemble piece by piece, these catastrophes are rare, usually affecting only small areas of land.

Ironically, it is when disasters do happen that corn, rice, and the other plants on which we depend would originally have grown. These so-called "annual" plants, which grow and die in a single year, tend to produce many, large seeds that germinate and grow quickly. This lets them seize bare ground and complete their life cycles before they are shaded out by larger, longer-lived perennials. Annuals do an important job, slowing soil erosion until perennials can get established, but annuals are rare – in the places least disturbed by people, only a few percent of the plant species present make a living this way.

Whether practiced with huge machines in giant fields or with a spade and a hoe in a tiny garden plot, the ecosystems humans build from scratch every year are the opposite of natural systems in just about every way: there have few species (often just one kind of annual plant), they are uniform (all the plants are the same size), and the plants present are entirely dependent on us to disturb the soil and remove competing perennial and annual species. In a sense, we create vast, unnatural disasters every year to encourage plants that would otherwise be rare.

The main reason we do this, of course, is that we get to harvest plants that we want, instead of whatever nature itself would produce in a given place. Annual plants produce more edible stuff per hectare than any natural system, and all six billion of us owe our lives to their slender, ephemeral stems.

Unfortunately, annual plants have many weaknesses. Most importantly, they just don't live long enough to get very big either above or below ground. If you look at month-by-month satellite photos of the US, states like Wisconsin, Illinois, and Iowa are almost completely brown from October to May. During those brown months,

soil is being washed and blown off vast areas, nutrients like nitrogen are leaking into ground and surface waters, and there aren't many places for birds, mammals, and insects to hide, feed, or raise their young.

Even when the land in those photographs is green, annual crops must be protected from competition using either herbicides or steel, weed-killing tools. Herbicides can be toxic to people and wildlife, and both herbicides and machines require large amounts of fuel.

We grow so few kinds of plants on so much land that our food supply is also very vulnerable to diseases and pests. The US now has more than 30 million hectares (80 million acres, almost two and half times the entire area of Wisconsin) planted to corn and about the same amount in soybeans each year. This staggering monotony is protected from diseases and insects with pesticides, genetic engineering, and other technofixes that would be much less necessary if we diversified our diets.

So what to do? Well, we could start by returning more of our land to oats, wheat, barley, and rye (all annual grains, but species that hold the soil better than corn and soybeans), as well as alfalfa and other perennial plants that are good for producing meet and milk. At the same time, we could shift land to fruit and nut trees (again, perennials) that hold soil well while nourishing us more healthfully than high-fructose corn syrup.

Another option that would keep us eating grain but spare us the faults of annual crops would be to get perennial plants to make more, larger seeds than they do in the wild. At The Land Institute in Salina, Kansas, for example, researchers are breeding a set of perennial plants that might eventually replace annuals like wheat and sunflowers. These crops would hold soil better than annuals, but they may not produce economically viable yields without another 50 to 100 years of research. Such sustained effort will require commitments from government and the private sector that they have so far been unwilling to make.

In your garden, you can use leaves, newspaper, cardboard, or other kinds of mulch to prevent erosion, grow as many perennials as possible (strawberries, raspberries, rhubarb, asparagus, herbs, etc.), and grow diverse annuals as well. These are small steps given the scope of the problem, but it's what we can do for now. Gardening in general is less damaging than large-scale farming.

In the long run, there's probably no form of agriculture at all that can support the earth's current population of more than 6 billion. I've talked to researchers who think that the planet *could* support somewhere between 100 and 400 million people indefinitely. It's unclear how (and how peacefully) we can get from 6 billion to 400 million.

One thing that is clear is that "from scratch" should stay in our kitchens and out of our fields.

As always, e-mail me if you have gardening questions (mittenth@gmail.com).