

## Gardening Level 2

### Advanced Gardening Tips

As gardeners observe their results year after year, they become aware of many interactive factors in their garden.

Some factors can't be controlled. Weather will affect yields. Rainy, cloudy weather will cut the amount of sunlight available for plants. Farmers have a saying that dry years will scare you but wet years will starve you. A poor harvest won't cause me to go hungry, but I still prefer a lot of bright days on the garden.

Gardeners can control some things. This list includes the following items:

- crop rotation
- soil pH
- nitrogen management
- phosphorus management
- potassium management
- soil microbes
- soil compaction
- soil moisture
- seedbed preparation
- plant population (spacing)
- cultivar selection
- planting time
- planting depth
- weed management
- disease management
- insect management
- harvest timing

There is interaction between different items. Here are three examples of how this interaction would affect yield. (For these examples I have let each component have equal value. They really have slightly different values but the idea is the same and the math is easier.)

Let's say you get everything perfect except on 10 items. On those ten items you score 9 out of 10. Interaction between all components will give you a 35% yield.

Compare that with what would happen if you got a perfect score on everything except 5 items and got 9 out of 10 on those five items. This would give you 58% of a maximum yield.

Doing everything perfect except for two things at 90% of perfect would give you a 89% of a maximum yield.

You can see how minor improvements can make a big difference in yield. The same concept holds true if you are gardening for aesthetics. They may not hold true if your gardening goal is relaxation. Advanced gardening involves managing each of these items so you make these minor improvements.

Let's look at these items. Crop rotation is one area where I have seen specific research numbers. In one experiment, yields on non-rotated crops dropped 7% in the first year. By itself, 7% isn't large enough to see but remember how it interacts with other systems to create a large yield reduction.

Most garden writers claim the way to deal with crop rotation is to keep a written record each year. I admire people that can do that but so far, I have been able to remember from year to year. As long as you are getting two years between the same crop, you are doing okay.

You can improve your management of the next eight items by adding organic matter. Organic matter will moderate the effects of low pH, add a slow release source of nitrogen, phosphorus, and potassium along with providing sites for these nutrients to hang out. Organic matter will reduce soil compaction, provide food for soil microbes, improve the soil's moisture holding capacity and improve the soil's ability to create a good seedbed. Organic matter can make more claims than snake oil but these are all true. While advanced gardeners may use a variety of additional strategies to address these eight items, most would certainly pay homage to organic matter.

A soil test can help you manage soil pH, phosphorus and potassium. Currently, the NCDA doesn't charge anything for the test. You wind up paying a dollar or two for postage. At that cost, it makes sense to take a soil test for a vegetable garden every year. In our clay soils, you can add phosphorus, potassium and lime once a year. Sandy soils have less ability to hold nutrients, so you have to add fertilizer more often. Nitrogen is mobile in clay or sand. Unless you have a slow release form of nitrogen, it must be used right before the plant needs it for growth.

Lime needs a few months to work so it should go on a few months ahead of time. Phosphorus doesn't work as good when the soil is below 50 degrees. If applied right before planting in cool spring temperatures, some phosphorus will be available for the crop before it gets locked up in the soil. Once it gets locked up, phosphorus requires microbes to make it available for plants. These microbes will be along as soon as the soil gets warm. Most years my soil doesn't need any additional phosphorus.

Keep your microbes alive. Soil microbes are important. All the nutrients that come into the plants through the root system are the result of a biochemical reaction. I have seen fields where the crop yield has went to zero because the microbe population was so low. We often ignore microbes because their size and diversity makes them hard to study. A tablespoon of soil may contain 100,000 bacteria. About 500 different species populate our soils. These normally make a living breaking down the carbon bonds in organic matter. So a person adding organic matter generally doesn't have to worry about microbes. The microbe population will respond to the additional food. Cover crops also add organic matter and provide food for soil microbes. I have

seen a couple of examples recently where I suspected the soil microbes were damaged by excessive potassium in the soil. Be sure not to add too much fertilizer.

Managing soil microbes helps you avoid soil compaction. A soil fungus helps keep soil from becoming a massive block of clay and, incidentally, creates the earthy smell we associate with good soil.

Soil compaction must be managed for good gardening results. Traffic by humans and machines causes most of the compaction in our gardens. Some gardeners manage this with permanent beds. Other gardeners use annual tillage. Everybody should avoid clay soil when it is wet. Another minor cause of compaction is rain. For some reason, I had almost forgot that one. Mulch will help reduce the compaction caused by rain. Or you could manage this compaction with an annual tillage. Another thing that may cause soil to pack down is water saturation during the winter. This compaction is small enough that it could be managed by tillage, although raised beds are another valid method to avoid compaction.

Soil moisture can make the toughest vegetable plants sound like Goldilocks. The moisture is often not enough, sometimes too much and seldom just right. Drip irrigation can solve these problems but it has to be intensively managed. You are trying to replace what evaporates every day. The second best method is hand watering but that takes a world of time. No matter what irrigation method you use, I can't emphasize enough how important it is to dig down to the roots and find out what the soil moisture is really like.

Seedbed preparation on clay soils means working the soil when the moisture is just right. Normally, if the soil has just gotten dry at the 3 inch mark, it is too wet down lower. Wait until none of the soils is too wet. The soil is too wet if you can squeeze water out and form a ball that sticks together. If you start working on it or even walking on it, you will create compaction. You have more leeway if you work it in the fall. Minor clods left on top will break up due to freezing over the winter. You also have more leeway if you have added organic matter.

On clay soils, you can also work on the soil too much. I can't tell you in writing when a gardener crosses the line from essential tillage to recreational tillage. However, if you keep at it you will do more damage than good. Not only will you get compaction, you cause extra organic matter to burn out of the soil and you can destroy the soil structure. If you use tillage, only use enough to create a good seedbed.

Plant population makes a world of difference. When you choose a plant spacing, you are balancing yield with quality. At higher populations you have better yield at the expense of quality. Not only will the size of the individual vegetables decrease, the sugars will decrease giving you a bland or mealy result. Even Extension recommendations on plant spacing favor quantity over quality. Most references I find are based on similar research.

If you are starting plants from seed, sometimes the plant population chooses us instead of the other way around. I generally prefer to plant high quality seed in a precise pattern and then irrigating to get a high percentage of them to germinate. The alternative would be to thin after planting.

Cultivar selection varies in importance. I can produce more zucchini and eggplant than I want to eat with any old cultivar.. Small trials with new cultivars in your own garden are the best way to learn which cultivars perform best in your situations. Precise record keeping could help you carry the knowledge from year to year.

The main way gardeners mess up timing is to plant when the ground is too cold. This can cause the seed to rot or attract insects like the seed corn maggot. The scientific way to get this right would be to use a thermometer and measure the top half inch of soil. I haven't gotten that serious yet. I know one gardener who takes a week and goes fishing when the air temperature gets right for gardening. By the time he gets back, the soil has had a chance to warm up. Finding something else to do sounds like a good strategy.

There are other timing considerations beside germination. Corn needs to go in the ground so it gets ripe before the second generation of worms. June 20 to 30 is the cut off for planting sweet corn. Potatoes need soil temperatures below 55 degrees to initiate tubers. If you get too late on beans and tomatoes, a hot summer may keep them from setting fruit. I have a chart available on suggested times for planting seed.

If you plant too deep the seeds can't make it to the surface. They also start in colder soil. If you plant too shallow, the seed may dry out before they get started. The old rule about planting a seed three times as deep as the seed is thick, works fairly good. In the spring when there is plenty of moisture, and the deep soil is cold, adjust the planting depth upward. In mid summer, plant a little deeper to take advantage of moisture.

Harvest timing means picking at the peak of perfection. On tomatoes you may want to give them a day or two after they turn red to pull in extra sugars. Cucumbers are better when they are small.

It takes experience to become an advanced gardener.