

## **Prime Market Garden Carrots**

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This summer I visited a friend who grows commercial carrots. Starting about ten feet from a hedgerow at the back of his yard, arrow straight rows of carrots extended all the way to a distant tree line without a weed in sight. The field looked to be about thirty acres. I asked him what he used to control the weeds so well. He returned my question with one of his own.

“You’ve grown carrots for market?”

“Yup.”

“And you don’t know about Linuron?”

“Never heard of it.”

My friend was amazed. Even though he knew I was an organic grower, he was surprised I didn’t know about Linuron. It only costs about \$35 - 40 per acre and kills just about everything except carrots and other plants in the Umbelliferae family such as parsley, wild carrot, and mayweed. He told me that if the conditions are right, a few grasses can survive, but I did not see a single blade of grass during my visit. It was clear that this herbicide would control weeds in a fraction of the time used in the most efficient organic system. Intrigued, I asked him to tell me more about his carrot growing techniques.

In the spring, he spends about three days working up the land with his own equipment. After that, a large contractor takes one day to plant and side-dress the carrots. The same outfit comes back two more times to apply herbicides.

At some time in late August the field is mechanically harvested in a day or two. The crop is trucked to the processing plant just a few kilometers down the road where they are turned on a lathe into ‘baby carrots’ or diced into cubes for frozen carrots.

After paying for fertilizer and chemicals, my friend could expect to profit about ten thousand dollars on his thirty acres of prime farm land. Once he works up the land, the only thing he has to do is irrigate in case of a dry spell. He has a state-of-the-art irrigation system that most likely cost more than the total equipment budget of a small market garden. It can irrigate a 5 acre field overnight, so keeping his thirty acres watered in a dry summer would involve moving irrigation equipment around most evenings. This is a lot of work and fairly expensive. It costs roughly six hundred dollars to put an inch of water on thirty acres.

Sometimes when I catch a glimpse of how efficient this kind of farming is, I wonder why anyone bothers with small-scale market gardening. Then I remember some important facts. First of all, for those of us who enjoy being outside in the fresh air using our bodies and minds to do something useful, market gardening is a great job and the food we

produce is of the very highest quality. Another important point to consider is that the kind of farming I saw on my friend's farm is simply out of reach for most of us. It is a system based on huge capital investments, high risk, and low returns.

Let's look at the realities of growing carrots on a small scale for a direct market without chemical inputs. Since there is no way that we are able to match the production efficiency of a large scale grower, we have to produce a carrot that is worth more, and tastes better if we are going to make money and have fun farming.

### **Seed bed preparation**

Carrots must have a deeply loosened, finely worked seedbed. When a carrot first germinates, it sends down a hair-like root that will become the carrot itself. If this rootlet grows into an obstruction, it will fork around it, make an abrupt turn to one side or stop growing altogether. In rocky soils, there will be some misshapen carrots no matter what you do to get the soil finely worked. But I have found that if the soil is very loose, even on fairly gravelly or stony land, the majority of the carrots will be fine. I have also found that if the land is not finely and deeply worked, those root hairs will not form well, even if the soil is sandy loam.

On a small scale, use a broad fork or a digging fork to loosen the soil as deeply as you can. Thoroughly pulverize any clods and rake smooth. If you are using a rototiller, set it as deep as it will go and make several passes since tillers never get down to their maximum depth on the first pass.

With a tractor, I have made raised beds by plowing in one direction with a three-bottom plow and then coming back from the other direction following my original wheel tracks. If your tractor's wheel spacing is set at the right distance relative to your plow, you will end up with a nicely rounded raised bed with dead furrows on either side for paths. After a few passes with a disc harrow and then an S-tine harrow, the beds will be ready to plant. Using this system, I have grown much better carrots than I ever did on flat ground.

If you are using horses to cultivate your garden, I probably don't have to tell you that the old-fashioned horse hoe and cultivator is far and away the best small-scale cultivation system for carrots. Since growing carrots with horses is an article in itself, I will leave this topic alone for now.

### **Flame Weeding**

Now you have a deeply worked, fine seedbed ready to plant. But wait, not so fast. There is something you can do that will greatly increase your efficiency. Remember, you are in competition with an industrial farming system that can grow an acre of carrots with a few hours of labor! After preparing the seedbeds, wait about five days and then plant your carrots. Does that sound crazy? Won't that give those awful weeds a head start? That's exactly what it will do-but there is a method to this madness -- flame weeding!

The idea is to let the weed seeds germinate ahead of the carrots. Then go over the field just before the carrots emerge, burning away the weeds with a propane torch. This allows the carrots to come up into a perfectly clean field. By delaying the carrot planting, you greatly increase the proportion of weeds that will germinate before the carrots, making the flame weeding truly useful. I find that if I wait until a few carrots are poking through every few feet I get the very best results, but that a safer practice is to flame the crop just before the first carrots come up.

A flame weeder is a simple wand attached to a small BBQ propane tank in a backpack. It allows for very precise use of the propane flame. I prefer the Red Dragon brand flamer. The squeeze valve pilot light option is a worthwhile investment. It will save a lot of propane and frustration from freezing lines.

### **Seeding**

I use an inexpensive Earthway seeder. It does a good job but can seed too thickly or unevenly if not used properly. If the seed has a high germination rate, and it is not being planted in very cold soil, I use the carrot light plate. For the first planting of the year when the soil is cold or when using questionable seed, I use the regular carrot plate and expect to do some thinning. When planting with an Earthway seeder, it is important to walk at an even pace. The seeder picks up the seeds and sends them down a chute with a few twists and turns in it. It takes several seconds for the seeds to make it to the ground. If you stop the seeder for just a moment, the seeds bouncing down the chute will all end up in a pile and then almost a foot of empty row will follow when you start moving again. So walk at a steady pace and don't stop to swat that fly on your forehead until you make it to the end of the row. The last point about using the Earthway is to make sure the seeding depth shoe is correctly set. Try to adjust it as shallowly as it can go while still making a furrow. The smoother the seedbed, the more shallowly you will be able to set the seeder. The more shallowly the seeds are in the ground, the better your germination will be, as long as the seedbed is kept evenly moist until germination. Which brings me to the next point: water.

### **Water**

Carrots, like most other cool season crops, do best when they get about an inch of water a week. Until they germinate, they are greatly benefited by irrigation before every sunny day. The way I do this is to set up sprinklers on planting day and leave them in place until the crop is up, and preferably until harvest for early crops that will mature in the heat of the summer. Making sure the crop gets enough water is the single most important factor in ensuring outstanding quality when carrots are sizing up in hot conditions.

### **Cultivation**

So the seed was planted after letting the weeds get a week's head start, then they were watered every sunny day and then they were flame weeded just before emergence. Now the carrots are up and growing. If the weed pressure is light and you timed the flame

weeding well, you can delay your first cultivation until the carrots are two to three inches tall. This is ideal because at that stage, you can lightly hill them, burying everything but the top inch or so of the crop. If the weeds are small enough, this will eliminate the need for in-row weeding. The few weeds that do make it can be pulled by hand over the next weeks, making sure to get them before they get big enough to damage the crop.

If you did not time the flaming well, or if you have heavy weed pressure the weeds will have an advantage on the young carrots. This means you will need to do a careful in-row weeding when the carrots are just coming up. Don't put off this tedious job, it will only get harder as the weeds grow larger. If you don't flame at all, you will most likely need to weed in-row one more time before the crop is tall enough hilled for the first time.

For the large home garden and the smaller market garden, I think that a wheel hoe is a great tool for precision cultivation. There are several models on the market, each slightly different, but they all share the same basic design. A single wheel is mounted in front of a metal bracket where various cultivation tools can be attached. Two long wooden handles extend behind the bracket, allowing the operator to use the tool with a push/pull action as he or she walks down the row at a steady pace. The only wheel hoe I have owned is a Glaser wheel hoe, available from Johnny's Selected Seeds. It is the most expensive model on the market, but is very well made and a pleasure to use. I try to get wheel hoe weeding done on a hot, dry day while the sun is high in the sky. It may be uncomfortable to be out there in the heat but it's even worse for all of those little weeds you are tearing up. If the weeds are small enough and the sun is hot, a quick stirring of the soil is all it takes to destroy 99% of the weeds.

### **Hilling**

I like to hill early and often. The first hilling, as I said before, is done as soon as the carrots are tall enough. The finer the soil and the more precise the hilling tool, the shorter the carrots can be. In light sandy soil, hilling with a hoe, I might draw up an inch of soil as I cultivate for the first time with the carrots only two inches high. In ground with rocks or clods, early hilling might do more damage than its worth. Wait until the carrots are larger, around four inches high.

Later on in the season, hilling does more than just smother weeds. As the carrots mature, hilling will keep the carrot's shoulders from turning green from sunscald. As well, it will help defeat the dreaded Carrot Rust Flies from laying eggs which can cause such discouraging losses. In the late fall, a well-hilled carrot patch is also much more resistant to damage from hard frosts and even more importantly, mouse attack! I have lost upwards of 20% of my late crop to mice chewing otherwise perfect carrots.

### **Timing of plantings and harvest**

With bunching carrots, I start planting as soon as the soil can be worked in the spring and plant every two weeks after that until the beginning of August. For storage carrots, I plant three or four times between mid June and mid July. The storage carrots are planted

several times for a few reasons. First of all, it spreads out the work of weeding into manageable blocks. This approach also allows me to use my irrigation equipment to germinate more carrots since the same gear can be used on one planting after another. The different planting dates give me slightly different maturity dates as well. Carrots planted in early to mid July are vastly superior to those planted in June for late harvest and storage.

### **Varieties**

I like Nelson for bunching and Bolero for winter storage. When growing carrots in a greenhouse, there is another variety worth mentioning: Mokum. It's tops are remarkably compact, making it particularly suited to greenhouse growing or other situations where space is at a premium. I have grown beautiful full sized Mokums in rows six inches apart with an inch or less between each plant in the row. I think this would make Mokum a useful variety for the space limited urban gardener as well. The eating quality of Mokum and Nelson are both very high. For summer bunching, I find that Nelsons look more appealing at farmer's market. They have large, dark green tops that scream, "Buy me!"

Another interesting thing about Nelson is that it's a very good storage carrot. It might be a bit lower yielding than Bolero but the quality is at least as good, and it stores just fine. If I wanted to grow just one variety, Nelson would be it.

### **Timing of harvest**

I like to harvest the winter storage crop as late as I dare. Sometimes I have finished digging the carrots with an early snow on the ground. Generally, I aim to get them in the barn by Nov 1. I wait so late because the more cold nights and warm sunny days they get, the more sugar they will have going into storage.

With bunching carrots, all of those little plantings allow me to sell carrots just as they size up, which I discovered in my first few years at market is the way to go if you want consistently high quality summer carrots. When a carrot is immature, the sugar has not developed yet but the oily carrot taste has. That's why immature carrots don't taste that good. By the way, those bags of little carrots in the supermarket aren't really baby carrots; they are big processing carrots turned on a robotic lathe to look like something young and tender.

So you want to wait until the carrot has filled out and developed some sugar, but here's the catch, if you wait too long, the summer heat will signal that carrot to get tough. I find that the more water I can give my mature summer carrots the longer they will hold quality, but no matter what I do, they will be at there very best for only a week or two. My solution is to make a small planting every two weeks. It is a lot of extra fussing but in the next section on marketing I will explain why I go to such trouble.

### **Marketing**

In my first year of farming I did not understand how much attention carrots need to be their best. I was late and lazy with the weeding, did not water them at all, and waited too long to harvest them. The next year I learned more about growing vegetables and had a really nice crop in early July. One day at market, while grabbing a bunch to put in a bag for a customer, I accidentally dropped them. It was surprising to see that more than half of the carrots in the bunch shattered when they hit the hard packed ground. As I put another bunch in my customer's bag I commented on how tender these carrots must be to break like that. This gave me the idea of dropping individual carrots on the ground to show potential customers just how tender my carrots were. The market crowd went nuts and within an hour the carrots were gone. Next week most of the people who bought carrots came back for more. A few of them jokingly asked if the carrots were still breaking when I dropped them. I had no choice but to repeat the previous week's demonstration. Sure enough, the carrots shattered and I sold out even faster than the week before. Of course, any children who caught this show loved it. They thought it was so funny and as everyone knows, children tend to be so much more sensitive to bitterness and toughness than adults, so when given a sample of these oh so sweet and tender carrots, they begged to buy some to take home. The next week I was disappointed to discover on harvest day that the carrots were clearly different. The surface of the roots had taken on a slight bumpiness and the tops looked just a little tired. They were fully mature and quality was going down. Sure enough, when I tested a carrot on the concrete floor of the barn, it broke in two but did not shatter into fragments. I would have some bad news at market but knew that I was on to something.

The next week at market I learned that bringing something exceptionally good two weeks in a row is enough to begin to build that thing that any retailer wants: customer loyalty. I had one person after another asking for those carrots that broke when dropped. I had to tell them that while I did have carrots, they were not going to be breaking for anybody, they were fully mature, they were past their peak. Over the next few years I developed a loyal carrot clientele. By being honest about any temporary drop in quality, I was able to express my commitment to being the best farmer I could be, in a way that customers appreciated.

After a few years of planting carrots every two weeks, weeding and watering them well and harvesting them at their peak, I no longer had to drop perfectly good food on the ground to make a sale. Children would drag their parents to my stall as soon as they came to market to make sure that they got some of my carrots. As anyone in marketing would surly agree, a healthy product that children beg their parents to buy is as good as money in the bank. And as everyone trying to make a go of farming understands, getting money in the bank is the big challenge in this line of work.