



introduction to organic vegetables

Selecting the Right Seeding and Transplanting Strategies

SEEDING GOALS

- Optimum soil-seed contact
- Precise seed depth placement for optimum soil temperature, moisture, emergence
- Accurate and consistent spacing for a uniform stand and less time thinning
- Limited time wrestling with equipment
- Few returns to the field to fill in misses or dead plants

CHOOSE EQUIPMENT THAT FITS YOUR SCALE, FINANCIAL CONSTRAINTS, AND STYLE

Small Farm on a Budget

Most small farms start out using a push “plate” seeder. Some people may argue that hand-seeding is more accurate and they don’t want to go back and thin. But, a seeder saves enormous amounts of time, and precise seed placement saves seed. The Earthway seeder is generally the most common and least expensive. It has a interchangeable notched plate that rotates inside the seeder, picking up individual seeds and dropping them through a hole in the side of the hopper.

Hand-transplanting can be fast and efficient for the small, diverse farm. If you choose hand-transplanting, make sure you work on your technique for efficiency

and ergonomics. Some farms will have one person with a good eye place plants and another person come along quickly and tuck them in. Others have a favorite tool, such as a Japanese transplanting hoe (Hori-Hori) that saves their wrists.

Small-Scale, Adding Efficiency

In that delicate balance of efficiency, precision, and price tag, many farmers choose a more precise push seeder after they are better established. Others still swear by the lightweight Earthway (see Equipment Reviews, p. 3). These seeders may have different cogs or plates with a greater diversity of hole sizes/spacing to allow you to change the seed spacing. Planet Jr., Jang AP-1, and Johnny’s European Seeder are common seeders to consider.

Medium to Large Farm

Four acres seems to be the breaking point where most farms go to tractor-mounted seeders and transplanters. Tractor-mounted seeders (like most push seeders) control seed singulation and spacing with a plate, a punched belt, seed cups, or vacuum systems. The difference from a push seeder is the time saved seeding over a large area. The tradeoff is that they can take longer to set up. But once you have them set up, you

can plant large areas faster than you can walk (unless conditions are not suitable and you have to stop constantly to unclog the equipment in wet or cloddy conditions). There are many types of seeders. The Planet Jr. and the Spyder Seeder are reviewed in this publication.

Time for a Mechanical Transplanter

Mechanical transplanters might not be faster than hand-transplanting for the first hour or so, but as your back and quads start to hurt from squatting and stooping, you slow down. Water-wheel transplanters are favorites these days because water delivered into the holes where transplants are set reduces transplanting stress and saves you time watering.

PLANTING STRATEGIES TO MAKE THE REST OF YOUR JOB EASIER

Straight Rows

You might think the pursuit of the perfectly straight row is merely a form of farmer pride, but transplanting or seeding in straight rows is essential, not only for the tractor-scale farm, but smaller scales as well. My first farmer mentor let me learn the hard way. While learning to drive a tractor and transplant, I planted a very wavy bed. When I came back to cultivate, it was impossible not to take out plants, even driving slowly. If you plan to hoe, you have more flexibility, but it is much faster to go quickly down evenly spaced straight rows with one pass of the hoe than working your way around uneven, scraggly ones.

Markers

There are a number of ways to mark your rows and keep them evenly spaced. Most push seeders will have an adjustable row marker. Some people stretch string. For transplants on the small scale, some use a row-



Japanese transplanting hoe.

marking rake or a push seeder without seeds. I am interested to try the rolling dibbler designed by the Healthy Farmers, Healthy Profits Project in Wisconsin. It consists of a roller with plastic cups attached to make divots in the soil at the desired spacing both in row and between rows. Josh Volk describes additional, more sturdy ways to make markers (see Volk, "Dibblers Make Planting Easier, Neater"). Another farmer I know marks his rows for seeding with the Williams Tool System (Market Farm Implements) tractor-mounted cultivator with row-marking knives (see photo on p. 3).



Rolling dibble marker for easy transplant spacing. Photo courtesy of B. Meyer, University of Wisconsin.



Planting with a water-wheel transplanter. Photo courtesy of D. Paashaus.

"Speed is no different with the transplanter. The main difference is the water. It is also much easier on your body."

—John Good, Quiet Creek Farm, Kutztown, Pa.



Row-marking knives mounted on a tool bar mark straight rows that can be used to guide seeding with a push seeder or hand transplanting. This allows for straight enough rows for mechanical cultivation. Marking knives are shown mounted on Williams Tools System tool bar at Quiet Creek CSA, Kutztown, Pa.

Spacing for Good Weed Management

I can't emphasize enough how important it is to set up your plant spacing for seeding and transplanting in a way that facilitates your weed management later. For example, a very common setup is beds on 5-foot (60-inch) centers. This gives you 48 inches of growing space and 12 inches of walking area. If you are on a smaller scale and the tools you plan to manage weeds with are an 8-inch wheel hoe and a 5-inch hula hoe, then your densest planted crops should have at least 6 inches of space between to hoe. If you are using

Desirable features of a good one row push seeder:

- Easy to push in a straight line
- Precise and even seed placement
- Allows accurate depth adjustment
- Easy to fill and empty
- Flexible and adaptable
- Visible seed level and seed drop
- Has a dependable row marker

Source: Coleman (1995)

“Labor and time savings are phenomenal (with our water wheel transplanter). We can plant 2.5 acres in one, albeit long, day with just two people—one to drive and one to transplant—with our one-row transplanter. This frees us for the myriad other tasks that time of year—tending to weeding, for example.”

—Claudia Ferrell (Grubinger 1999)

a tractor, the standard is a 3-2-1 system where your largest spaced crops are on 60-inch centers, your medium-size crops are 28 inches apart, and smaller crops are 14 inches apart. Choose a few plant spacings that work with your equipment and stick to them—this saves monkeying around moving sweeps or trying to find a narrower hoe later.

Calibration

No matter which seeder you use, it is worth the time to check and make sure it is functioning. I have made the mistake of not checking, usually when I hurry, and then finding out later that there was a problem. This can be heartbreaking when you have missed a window for a succession of carrots or end up with such a patchy planting of spinach that it is not worth the time to cultivate it. Common problems are cobwebs in the seed tubes of tractor-mounted seeders, plates not picking up seed or grinding it, or choosing the wrong setting. Generally, I calibrate a hand seeder by picking up the seeder and turning the drive wheel a certain number of times, which correlates with the distance it would travel in the field and counting or weighing the seed that comes out. If I don't get any seeds, I know there is a real problem. On a seeder that you can change belts or gears to change the spacing, calibration can save a lot of seed and time later.

EQUIPMENT REVIEWS

The following equipment reviews are included to give new producers a taste of the benefits and drawbacks of various seeding and transplanting equipment. Equipment choices tend to be very particular to the farm and the farmer, and the following comments are not exhaustive or meant to promote the use of a particular brand or company.

Seeding Equipment Comparison

The Seed Farm, Lehigh County's Agricultural Incubator Project, trialed small-scale seeding and transplanting equipment in their two-acre demonstration and training garden during the 2010 season. They trialed the following equipment: Johnny's six row seeder, Earthway push seeder, the Seed Stick planter, and the Glaser pull seeder. The seeders were used to direct-seed four crops: carrots (Johnny's six row seeder, Earthway, and Glaser), spinach (Johnny's six row seeder and Earthway), arugula (Johnny's six row seeder, Earthway, and Glaser), and cucumbers (Earthway and Seed Stick). All five Seed Farm apprentices were trained to use the different seeders. Their conclusion was that the Earthway was the most versatile of the seeders, but for certain crops, the other seeders were useful. In particular, the Glaser was much better than the Earthway for planting arugula and other brassicas because it did not grind up the seed. Johnny's

six row seeder was more efficient than the Earthway for planting salad greens (arugula and spinach), but it only worked in very finely prepared soil. The apprentices did not find the Seed Stick useful for cucumbers because the seed tended to get clogged in the seeder. However, it was useful for slightly larger seeds like summer squash and winter squash.

Johnny's Six Row Seeder

The six row seeder is designed for salad mix and baby green production. Up to six rows can be planted at once with 2¼-inch spacing. Growers can use it on well-prepared beds for the consistent placement of densely planted seeds. It can plant many seeds accurately for intense high-tunnel production. However, this seeder does not seem to work well in rocky or clumpy field soil. Another concern is there is not an easy way to mark when you have the seeder calibrated, so you end up having to fiddle with it each time you use it. The six row seeder is only suitable for small-seeded crops (under beet size) and it does not always press seed into the soil, which requires beds to be rolled following seeding.

Earthway Seeder

The Earthway seeder generally gives precise seed placement, allows for depth adjustment, and is easy to fill and handle. Nicole Shelly of Gotschell Farm in Emmaus, Pennsylvania, says, "I can use it on all my crops with reasonable accuracy and reliability. I chose it because it was economical and had a good/decent reputation." I like that it is lightweight and easy to handle. However, if your farm has heavy or rocky soil, such a light seeder may be difficult to use. Another common problem is small seeds getting stuck behind the small brassica seed plate, crushing seed and preventing the seeder from picking up and depositing seed correctly. Growers recommend a number of remedies from reinforcing plates to simply buying new ones. Elliot Coleman (1995) re-drills the holes at a blunter angle, so there is not as much slope to force the seeds behind the plate. The plates may also develop a static charge where seeds stick to the plate. The manufacturer recommends that you "coat the plate with liquid soap and let it dry without rinsing."

Four-Row, Pinpoint Seeder

Daniel Matz from Keepsake Farm and Dairy in Bath, Pennsylvania, uses the four-row, pinpoint seeder because "it is insanely quick," simple to adjust and operate, and seems sturdy. Like any pull or push seeder, it can get stuck and not drop a seed, but since you can easily tell if the wheel tines are spinning or not, you can just go over the part where it stopped turning. It plants lettuce and other greens very close (2¼-inch spacing with all hoppers full) or can plant at a wider spacing by filling fewer hoppers. You control

the seed depth by angling the handle lower or higher, "which is easy, but it can get a little awkward to hold at a low angle, especially as you draw it nearer to your body," according to Daniel. There are a few limiting factors. He says, "The hoppers don't have a huge capacity, so you have to keep extra seed handy and watch for the levels to go down—get distracted and you might miss where you stopped planting. There's no cover for the hoppers so water can get in if it's raining or you're in a drippy greenhouse." It is also only suitable for small seed (under beet size).

API Clean Seeder (Jang)

This is a push seeder available from Mechanical Transplanter and others. Josh Volk from Slow Hand Farm in Oregon says, "It is an excellent upgrade from the Earthway. It has much more control in metering and heavier, wider construction that makes it work better in heavier conditions."

Spyder Seeder

Ben Shute from Hearty Roots Farm in Tivoli, New York, explains his Spyder Seeder: "I decided not to buy one of the prebuilt seeders (not easily available in the U.S.), but to buy the main parts of the Spyder (hopper, controller, meterer) and build my own frame for it, so I could use it mounted to the belly of my Allis Chalmers G tractor (the prebuilt units are three-point hitch units to mount behind a utility tractor). Also it's cheaper that way, but still not cheap—the parts alone cost me \$3,000. I bought them from Sutton Ag in California."

The unique part of the Spyder is the seed metering/delivery system, not the parts that deal with the soil. That is, the shoes/openers, press wheels, etc., are all



Seeding lettuce next to tomatoes with an Earthway seeder at the Seed Farm, Vera Cruz, Pa. Photo courtesy of J. Zehr.



The Jang seeder has interchangeable rollers with holes drilled to singulate seed. It is shown here with the cover removed to show the gears that can be changed to adjust seed spacing.

just standard parts that Ben used, not Spyder-specific. The Spyder parts are a hopper that can feed between one and six rows using an electric motor that spins a dry sponge, gently pushing the seeds into spouts, and a controller to control the speed of the motor. It can deal with almost all of the types of seeds Ben uses on his vegetable farm, except corn and beans (too big). The rounder the seed, the more consistent the metering, so Ben uses pelleted parsnip and carrot seeds because that works better. It's a huge advantage that just one hopper can feed up to six rows because with other seeders (Planet Jr., etc.) you need one hopper per row, which means filling/emptying every hopper to change varieties, and you need more seed to "prime" each unit. With this, you don't need much to prime the unit, and it's super quick to change varieties.

An adjustable dial controls the speed of the electric motor that meters out the seeds. It's not as accurate as a vacuum seeder, which can place a seed precisely, but it gives you control over how fast the "dribble" of seeds is. It's not perfect spacing, but very controllable.

Although you can seed from one to six rows, it's not quick and easy to change the number of rows you're seeding; you either need a separate piece, which would take a couple of minutes to change, or you need to "hack" it and just creatively plug off certain rows, but that's not an ideal solution.

For additional discussion of seeders and transplanters, see the references below. For additional reviews, see the "Farmer Profiles" on extension.psu.edu/start-farming.

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