

Horticulture



Beginning and Small Acreage Farms: Nonmotorized Tool Selection

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Farming on 2 acres or less can be challenging, especially when considering equipment selection. It is important to carefully consider the equipment options available. Tools should be cost-effective, task and operation appropriate, of high quality and durability, and provide labor savings. Appropriate equipment contributes to farm viability by enhancing labor efficiency and crop quality. This fact sheet briefly describes equipment beginning farmers commonly need or use on small farms.

Factors to consider when choosing

equipment. When selecting tools and equipment, consider the crops being grown, the space being managed, the frequency of use, and the available finances to help determine equipment needs. Potatoes require different tools for planting, crop management, and harvest than bell peppers. Tomatoes grown on plastic mulch (plasticulture) as the farm's primary crop will require different tools than the basil grown to compliment those tomatoes. In addition, how the product is marketed can determine equipment needs. Cut and bagged lettuce requires wash and rinse basins that whole head lettuce does not require.

Farm size is one of the biggest limiting factors when considering equipment selection. For instance, while small tractors contribute significant labor and time savings, they may not fit the farm, be difficult to utilize and store, and the associated implements may

be too expensive to own.

Small scale growers often find that nonmotorized equipment requires more labor but is better adapted to the farm. Renting or borrowing larger equipment can eliminate capital investment in underutilized tools, improving farm profitability.

Tools and equipment for small farms. Using the correct tools and equipment create labor savings, reduce the time spent on a specific process, and improve farm efficiency. The most expensive tool is not always the best tool. Prices are provided to help estimate the cost of new equipment only. Look for durability, functionality, and practicality before purchasing new equipment. Some key activities requiring tools and equipment include site preparation, planting operations, site management, crop harvest, and postharvest handling.

Site preparation. Site preparation involves loosening and inverting the soil, incorporating soil amendments, eliminating weeds, and preparing the soil for planting. Tools and equipment that can be used for site preparation include (Figure 1):

Border or flat spade: A square-nosed shovel with straight sides turns soil along a straight line and to an even depth. Flat spades are used in a soil turning process called double digging, which increases soil drainage and aeration by moving blocks of soil in a pattern to a slightly different location in the soil profile. This tool is often sold with a shorter length d-handle to improve ease of use. Price ranges from



Figure 1. Site preparation tools: various types of forks, spades and rakes.

Broad fork or spading fork: Also called a U-fork or grelinette, this fork is much wider than a spade and can turn larger volumes of soil. It is used to break up dense soil, increasing aeration and improving drainage. Instead of double digging, it simply lifts and breaks up the soil and can help incorporate amendments. Price ranges from \$80 to \$250.

Manure or pitch fork: If you plan on composting, a pitch fork is needed to turn and move compost piles. Forks can also spread amendments or help gather and remove old plant debris. Forks range in price from \$30 to \$50.

Hand tillers: Hand tillers break up soil, and improve drainage and aeration. Hand tillers are pushed into the ground and then rotated to move the soil. Hand tillers cultivate to depths of 4 to 6 inches. In previously worked or not heavily compacted soils, these tools are easy and quick to use. Garden Weasel, DeWit, and Yard Butler make

high quality hand tillers and costs range from \$25 to \$50.

Bow and garden rakes: Rakes help level beds and smooth out soil in preparation for planting. A rake is used two ways: (1) with the tines down, it breaks up and spreads material, and (2) when flipped over, the rake smooths and levels the planting bed. Wider rakes make it easier to create a level bed. Rakes range in price from \$15 to \$50.

Composter: Compost is essential to soil health. Making your own compost is easy to do and can save money and improve sustainability. Composting bins can be made from untreated pallets or fencing, or one can purchase a rolling bin or easy-assemble plastic or wood bins. Make sure the composter has enough space to accommodate the amount of plant waste you plan to compost. Cost varies greatly.

Planting. Planting takes time and planting aids help save both time and money, especially when planting large areas. Commonly, seeds are planted directly in the field or planted in soilless media to grow transplants. Transplants can be bare root plants or raised in blocks, trays, paper pots, and plant tapes. Planting tools help ensure ease of planting, even spacing, and proper planting depth for seeds or transplants (Figure 2).

Soil blocks: Soil blocks contain a small well at the top of the block for the seeds. Block plants reestablish growth quickly when transplanted to the field, and tray storage and plastic waste issues are avoided. Blocks come in different sizes, shapes, and varying soil volumes. Prices range from \$20 to \$200 depending on type, volume, and number of blocks.

Transplant trays: Transplant trays are used to produce healthy transplants with well-formed root systems. Trays vary in cell number, cell depth, may be plastic or biodegradable paper, and come in a range of durability. Heavy duty plant trays can be sanitized, stored, and reused many times. Packs or tray liners are disposable, are made from thinner plastic, and are commonly not re-used. Liners and trays can be purchased in bulk and sourced from online greenhouse and seed supply companies. Prices vary based on product, cell number, and



Figure 2. Planting tools: various transplanting or seeding tools, row dibbler, and hand trowels to assist in planting operations.

durability. Biodegradable trays or liners usually cost more.

Dibbler: Proper and even crop spacing is important, as it reduces plant-to-plant competition, improves weed management, and maximizes plant numbers in a set area. Use hand-held dibblers in conjunction with seeding square areas or a homemade spacing tool to ensure even plant spacing across the bed. Rolling dibblers provide a uniform spacing pattern, and are fast and accurate. Costs vary greatly and range from \$10 to \$300 depending on the complexity of the device.

Seeders: Small, hand-held seeders are used for planting into seed trays or soil blocks. They consist of a cup and bellows that force seeds into the planting media. Stab planters save time and labor when planting larger fields. The planter is pushed into the ground, a lever is opened, and seeds drop through a tube into the hole. This low-tech seeder effectively plants corn, peas, beans, squash, and other larger seeded crops. Walk-behind seeders are well adapted for larger areas. They open a furrow to a specified depth and use various methods to dispense the seed into the furrow. Behind the seeder is a closing device that refills the furrow with soil, effectively planting the seed. Plant spacing is achieved with cups, belts,

vacuum, or plates with interchangeable dispensing units to accommodate differences in seed size and spacing needs. Always use high quality seed, know the percent germination, and for irregular shaped seeds, consider pelleted seed. Costs vary greatly and range from \$100 to several thousand dollars depending on the complexity of the planter.

Paper pot planter: A newer implement on the market is the paper pot planter, a planting system widely used in Asia. The system requires specialized paper pots that come in various sizes and spacing to accommodate final plant size. The pots are filled with media in specialized trays, seeded, and once the transplants reach appropriate size, the entire tray is fitted onto the planter and transplanted. As the planter moves down the row, the chain of plants move through and are evenly planted. The paper pots biodegrade over time. This planter comes in single and double row units and can save time and labor on the farm. Cost for the single row system starts at \$2,000, and you must purchase the paper pots each year for planting.

Small hand tools: Various small hand tools are essential for planting and other planting-related tasks. Select tools by personal preference which are durable, comfortable, and versatile for the task. Hand tools include small, hand-held trowels, three-pronged mini rakes, hori knife, a hand hoe for digging or making rows, and other tools that speed up planting and save time and labor. Prices vary greatly.

Site management. Reducing weed pressure during the growing season is critical to ensuring higher yields and reducing disease and pest incidence. Tools needed for weed control include hoes, small hand tools such as trowels and hand weeders, and handheld sprayers. It is important to find tools that are comfortable and that work for the situation, soil type, and growing system (Figure 3).

Hoes: Hoes are essential for weed management. They reduce labor by extending the users reach and quickly cut the weed to kill or set back weed growth. There are many hoe types including digging, draw, reciprocating, flat, and sweep hoes. A favorite is the scuffle or hula hoe (reciprocating type) with its open



Figure 3. Site management tools: can and backpack sprayers, wheel hoe and attachments, and various hand hoes.

center and thin sharp blade. Hoe handle length and the angle of the cutting surface is important and when fit properly, these can reduce user fatigue. Hoe prices range from \$10 to \$100.

Wheel hoe: A wheel hoe is a tool designed to quickly weed between rows with minimal effort. These can be fitted with various attachments that furrow, cultivate, or hoe soil and weeds. Most are customized by the manufacturer. Other attachments include seeder-planters, dibblers, disc harrows, and small plows, making the wheel hoe a multi-use tool. Wheel hoe prices range from \$100 to \$250.

Pump sprayer: Pump sprayers are used to apply herbicides, insecticides, and liquid fertilizer applications. Purchase and label individual sprayers for each purpose to ensure safety and minimize potential cross contamination. Pump sprayers are inexpensive and effective in a small space. Sprayers can be hand-held or fitted with backpack straps. Battery powered sprayers are slightly more expensive but reduce fatigue. Sprayers vary from 1 gallon to 5 gallons and cost from \$10 to \$200.

Post pounder: Trellises and other vertical growing structures are used on small farms to maximize production spaces. These structures require t-posts or staking. A post pounder aids in installing the posts, saving time and labor. Post pounders cost \$30 to \$50.

Harvest and hauling tools. There are many other hand tools that are helpful on the farm. Most growers have their favorite tools that are used regularly. The list provided are suggestions that may help the beginning small farmer.

Wheelbarrow or yard wagon: These tools provide an easier way to move larger loads of compost, soil, harvested produce, and plant waste. There are many types of wheelbarrows. Find one that is high quality, will last, and suits the intended purpose. Some wheelbarrows now come with a flat free tire that can be worth the additional investment. Longevity is an important consideration; steel is more durable than plastic. Prices range from \$50 to \$300.

Harvesting baskets, crates, or buckets: Baskets and buckets are useful tools that aid in produce harvest. Most will work as long as it suits your needs. Those with larger volumes may be too difficult to lift or cause injury to produce when overfilled. Specialized harvest baskets made from wire or plastic mesh are helpful when rinsing soil from produce or when containers need to be cleaned or sterilized. Longevity is an important consideration; plastic or wire mesh crates last longer than wooden baskets. Container prices vary greatly.

Harvesting tools: Knives, scissors, and snips help with harvesting. Tools should be sharpened regularly and sterilized frequently during the harvesting season. Harvesting tools that work efficiently and safely help preserve the quality of your produce. Prices vary greatly.

Garden fork: Garden forks have four wide and flat tines and are often sold with a shorter length d-handle. Using a garden fork to lift tubers, roots, or plants from the ground can help reduce damage during harvest and makes the process efficient. Crops such as potatoes, dahlia tubers, and garlic particularly benefit. Prices range \$20 to \$90.

Summary. Small-scale farming requires intensive management and labor, but appropriate equipment contributes to farm viability and enhanced labor efficiency. There are many tools to

choose from and having them available improves site preparation, planting, site management, harvest, and postharvest handling. Tools should minimize the work required and maximize your efforts. Tools should be durable and of high quality. While high quality tools often come with a higher cost, their durability and improved designs

make them better choices for the farm. Before purchasing any tool, do your homework, read online reviews, or ask other experienced small-scale growers what tools they use and how impactful they are on the farm. However, what works for one grower and operation may not work for another, so choose your tools carefully.

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