

Chapter 6

HORTICULTURAL EQUIPMENT MANAGEMENT



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Chapter 6

Horticultural Equipment Management

George F. Gardner, Former Extension Educator, Bannock County, Pocatello

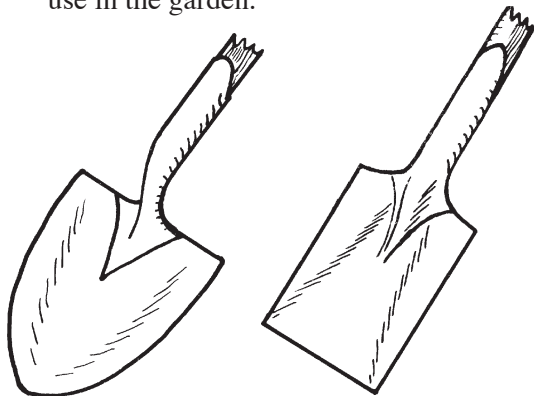
I. Equipment Selection

The type of equipment used to prepare your garden will depend on the size of the garden, as well as your physical ability, time, and budget. Options include a spade or shovel, a power rotary tiller, a small garden tractor, or a full-sized farm tractor.

A. Hand Tools for Cultivating

The minimum equipment needed by most gardeners is a shovel or spade, a hoe, a rake, and a trowel. A wide selection of styles is available. The right choice is one of personal preference and price. You can get the best value by knowing each tool's uses and particular qualities.

1. Shovel—A dish-shaped blade mounted to the handle at an angle and is used for moving soil. A garden shovel with a pointed blade is lighter and smaller than most other shovels and is well suited for use in the garden.



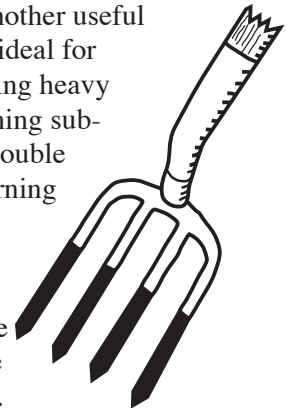
Shovel

Spade

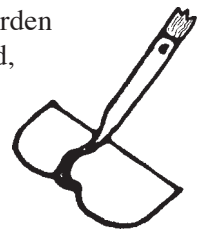
2. Spade—A flat blade and designed for cutting rather than lifting or moving soil. A spade is an excellent tool for shaping straight-sided trenches and edging beds.

Note: Shovels and spades come with long handles in standard or D-shaped styles. Choice of handle style will depend on personal preference: long handles offer greater leverage and are less tiring to use; short handles are often thicker and stronger. For general purpose digging, lifting, and moving, a long-handled shovel is ideal.

3. Spading fork—Another useful digging tool. It is ideal for breaking and turning heavy soil and for loosening subsoil layers when double digging a bed. Turning coarse compost, spreading mulches, and digging root crops are other jobs suitable for a spading fork.

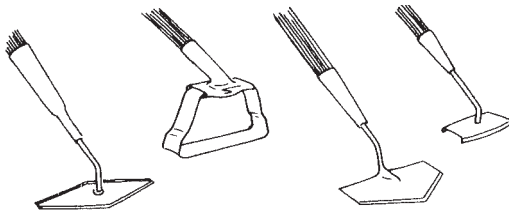


4. Hoe—Essential in any garden for preparing the seed bed, removing weeds, and breaking up encrusted soil. Several different hoe styles are available.
5. Pointed hoe—Has a heart-shaped blade and is lightweight and useful for opening seed furrows and cultivating between plants.
6. Hula—Or action hoe, is very lightweight and maneuverable. It is pushed and pulled just under the soil surface. Because the blade is relatively thin and lacks the clod-breaking capabilities of a heavier hoe, this type of hoe is most eas-



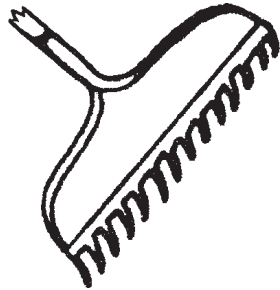
ily used where soil is not compacted and where weeds have not gotten started.

7. Scuffle hoe—Is somewhat more sturdy, and is used with a pushing motion rather than a pushing and pulling motion.

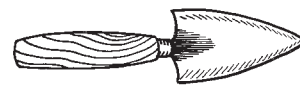


Different kinds of scuffle hoes

8. Square-bladed hoe—Probably the most commonly used hoe, lends itself well to many garden tasks.
9. Rake—Useful in clearing the garden of rocks and debris. It is also helpful in spreading mulches and smoothing seedbeds. The right rake depends on your size and strength and the uses you intend. As the number of tines increases, the rake weight also increases. Avoid choosing a rake that is so heavy it will tire you after a short period of use. The length of the rake handle is important too. The tip of the handle should come up to your ear when you stand upright. A handle that is too short will make your work harder, causing excess bending and back strain.



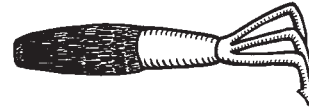
10. Trowel—Used for many digging jobs that do not require a full-sized tool. Especially in the spring, a trowel is perfect for transplanting seedlings and bulbs or digging shallow-rooted weeds.
11. Small hand cultivator—Often sold in sets with trowels, is useful for weeding small areas and between closely-spaced plants.
12. Digger—Also called a weeder, cultivator, or asparagus knife, is a small, useful digging tool. It is indispensable for digging up weeds with long taproots, such as dandelions or Queen Anne’s lace; or for prying out Johnson grass rhizomes. It con-



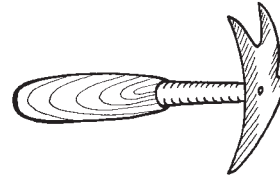
Transplant trowel



Small digging fork



Hand cultivator



Planting—Cultivating hoe



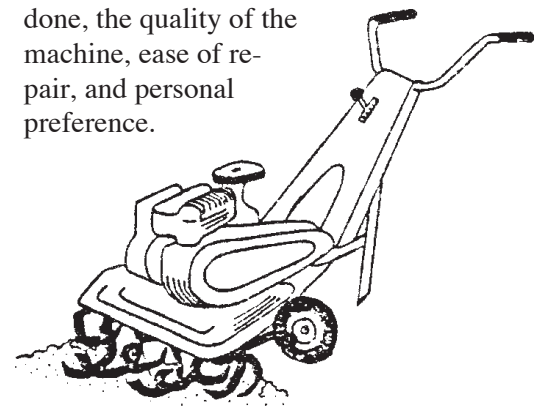
Dandelion digger or asparagus cutter

sists of a 10- to 14-inch long solid metal rod with a two-pronged blade at one end and a handle at the other. This tool is practically indestructible and well worth its price.

13. Pickax—Used to break up extremely stony or hard-packed soil.
14. Mattock—Used to break up soil, but is equipped with a cutting blade for removing large roots. A mattock may also be used to chop up debris for composting.
15. Wheel cultivator—Has a number of attachments for soil preparation and weed control and may prove to be a good investment for those with larger gardens.

B. Power Tools for Cultivation

1. Rototiller—The power rotary tiller is the tool most commonly purchased by gardeners. Whether you need a rototiller depends on the size of your garden, your capabilities, and the intended uses of the tiller. Tiller selection may be based on the nature of the work to be done, the quality of the machine, ease of repair, and personal preference.



The tiller's engine powers rotating blades, or tines, which turn the soil and makes it loose, fluffy, and ready for planting. It can also chop plant debris and mix it into the soil. The ability of the tiller to do these jobs effectively is a function of its weight, strength, design, type of tines, and type of soil.

A heavy, powerful tiller is most effective on stony clay soils, while a smaller tiller is more appropriate in a small garden or a garden with light soil. Very lightweight tillers, known as soil blenders, are designed mainly for raised bed gardening; however, they are not widely available and generally must be mail-ordered. A tiller is a major investment.

Look for tiller features such as: heavy cast iron, steel plate, and tubing; heavy bearings; strong welds used during construction; and easily operable controls. Ask to look at the operator's manual and try to determine how simply a tune-up can be performed. You can save yourself a great deal of trouble and money if you can replace plugs and points yourself. Also consider the locations of service centers and parts dealers. Careful attention to your needs, abilities, and price range is important.

Talk to people who have the types of tillers that interest you. If possible, borrow or rent various types of tillers and send for information before buying. If you are considering the purchase of a used rototiller, plan to do so well ahead of time so you will not be rushed into a purchase. If you know little about tillers, have a mechanically-minded friend evaluate the models you are considering.

Above all, test each tiller for ease of starting and operation. An engine that smokes or runs roughly may require a lot of work. Tines should operate smoothly and freely. Check the welds in the handles to see that they are strong; re-welding may mean that the handles have broken at some time, a common problem in older tillers. Look at the dipstick if there is one; low oil or very sludgy oil

may mean that the tiller has been poorly maintained. The oil and other fluids may also be checked by opening the drain plugs. Look for excessive dirt around the engine or in the air filter. This may also indicate bad maintenance habits.

- a. *Rear-tine tiller*—If gardening is a full-time business or if you have a large garden, it would be wise to purchase a rear-tine tiller. It should be a heavy-duty machine capable of continued operation. The rear-tine tiller is easier to control and is smoother in its cultivating process. It requires less maintenance because it doesn't bounce around; leverage is required for control. New gardeners are sometimes scared away from these tillers because they can run away with them.
 - b. *Front-tine tiller*—If gardening is simply a hobby, or if your garden is small, a front-tine tiller may be suitable. Front-tine tillers are usually light in weight, but may require considerable strength to guide them through the soil. Operating this type of tiller is comparable to handling a large floor polisher such as those used in schools and hospitals. Leverage is required for control. New gardeners are sometimes afraid that these tillers will run away with them. The front-tine tiller may not make as straight a path as the heavier rear-tine type, but it is much easier to turn. The front-tine tiller is easy to use in small gardens and in corner areas.
3. Cordless tools—Most are rechargeable, come with various cultivating attachments, and can make garden chores more pleasurable. Cordless tools are especially useful to those with physical disabilities that limit strength.
 4. Garden shredder—This tool is helpful for a large garden with a lot of plant wastes. Hand-operated shredders are slow but useful if wastes are in small quantities and are not too coarse. Gasoline shredders are quite expensive and may be disappointing to the gardener who wants to

chip branches and other large materials. Shredders are best used for shredding leaves, small branches, and other plant wastes. A chipper, on the other hand, will chip large branches and other coarse materials, but the cost (\$1,000) is high.

C. Wheelbarrow or Cart

A wheelbarrow or cart is handy to have in and around the garden area. It should be easy to handle when full. Durable construction is well worth the cost to ensure a long, useful life. Be sure to choose the size appropriate for your physical abilities and garden needs.

A wheelbarrow generally requires more strength and control than do most garden carts, but many of the small carts generally available are made of relatively flimsy metal and, though inexpensive, are not particularly long-lasting or suitable for heavy items such as rocks.

Consider your needs. If you plan to haul only light straw, leaves, or sawdust, then a small cart is suitable. For heavier jobs, a wheelbarrow or cart is needed.

The newer garden cart models, especially ones with bicycle-type tires, are made of heavy plywood and metal and are well-balanced and easy to maneuver.

Note: These carts do, however, cost a lot (up to several hundred dollars) and a large storage space. Only serious gardeners, or those with other uses for these carts, find them economical. One alternative is to build your own from one of several plans available from gardening magazines or private companies.

D. Watering Equipment

Watering is one job that most gardeners must do at least occasionally. An adequate water supply may make a big difference in garden yields. Purchase of watering equipment depends upon available facilities, water supply, climate, and garden practices. Determine whether cultural practices such as mulching, close plant spacing, shading, or wide-bed planting will meet most of your extra water needs, then purchase watering gadgets accordingly.

1. Spigot—If there is no outdoor spigot near the garden, the expense of having one installed may be greater than the benefits gained, except in very drought-prone areas, or in the case of a gardener who is fully dependent on the season's produce.
2. Rain barrel or garden hose with a fan-type sprinkler—This simple watering equipment will suffice where rainfall is adequate, except occasionally in summer.
3. Water breaker—Useful for small seedlings.
4. Drip irrigation system—In areas where there are extended periods of hot weather without precipitation, the local water supply is likely to be short. Since overhead sprinklers waste water, a drip irrigation system may be in order. Drip irrigation puts water right at the roots and doesn't wet plant leaves, thus helping to prevent disease. Timers are available for automatic drip watering systems, but this type of system is relatively expensive and may be considered a nuisance by some gardeners because of maintenance and replacement requirements.
5. The soaker hose—Probably the least expensive and easiest water system to use. It is fibrous hose that allows water to seep out at a slow rate all along its length. There are also hoses with holes in them that do basically the same thing. A flow regulator usually has to be included with the system so that water can reach the end of the hose, yet not be sprayed out at full force. A special double-wall type irrigation hose has been developed that helps to maintain an even flow.
6. Emitter-type system—Best used for small raised bed or container gardens. With this system, short tubes, or emitters, come off a main water supply hose. Emitters put water right at the roots of the desired plants. This is generally the most expensive form of irrigation and most complex to set up.

E. Seedling and Planting Tools

Depending on the size of your garden and your physical abilities, you may want to consider a row seeder.

1. Seeders—With wheels make easy work of sowing long rows of corn, beans or other vegetables. Seeders are available that make a furrow, drop the seeds properly spaced, and close up the furrow. It is not worth the effort to set up a seeder for small areas. A hand-held seeder is probably a better choice for this type of work.
2. Broadcast seeders—Are available for sowing seeds such as rye or wheat for cover crop, but are generally not necessary for the average home gardener, because broadcasting is easily done by hand once you learn the proper technique.
3. Fluid-sowing kits—Contain presprouted seeds in a gel that prevents drying. These kits may be purchased, but fluid sowing devices may be made inexpensively.

F. Environmental Monitoring Equipment

Serious gardeners often invest in equipment that allows them to monitor the microclimate around the garden or indoors.

1. Rain gauge—An inexpensive device that helps you determine if enough rain has fallen for garden plants.
2. Maximum-minimum thermometer—A costly, but often useful, device to measure soil temperature and internal temperature of a compost pile.
3. Light and watering meters—Can be purchased for indoor plant monitoring. Electronic water meters measure the conductivity of soil, but are often greatly influenced by fertilizers and other salt concentrations, resulting in a variable or inaccurate measurement of water availability. Tensiometers work well for measuring water content.

G. Trellises and Cages

For vining plants, these save space and keep fruits off the ground, reducing plant damage and minimizing the amount of stooping required for harvest. Look for heavy-duty materials and sturdy designs that will stand up to rain, wind, and drying. Wire should be heavy gauge and wood should be treated with nonphytotoxic (nontoxic to plants) materials or materials nontoxic to humans. Metal parts should be rust-proof or rust-resistant.

If you build your own trellises and cages, you may save a considerable amount of money and get better quality.

H. Harvesting Equipment

Varies depending on the size and type of garden, whether food is to be stored, and the way in which it is to be processed.

1. Baskets—Useful to most gardeners. Baskets may be purchased at garden or farm supply stores or sometimes may be scrounged from local grocery stores or fruit stands. Berry baskets for carrying small fruits, baskets with handles for carrying vegetables, and peck or bushel baskets for storing fruits and vegetables are all useful.
2. Fruit pole pickers—Useful and easy to use for tall fruit trees.
3. A sharp knife—For cutting vegetables off plants is handy and helps prevent plant damage.

II. Equipment Purchases and Maintenance

A. Equipment Purchases

When purchasing tools, buy for quality rather than quantity. Your tools will be in frequent use throughout the garden season. Cheap tools tend to break or dull easily and may end up making your job unnecessarily difficult and frustrating. Quality tools will last and tend to increase in value if well kept.

Tools should be lightweight for easy handling, but heavy enough to do the job properly. Metal parts should be of steel, which will stay sharp, will keep their shape, and will outlast softer metals. Consumers' magazines and garden publications frequently have articles explaining what to look for in tools and listing alternatives to local hardware stores, which often carry a single line of tools. Several excellent books featuring garden tools have been published and may be available at the library.

B. Equipment Maintenance

Keeping a tool clean and sharp will increase its usefulness and lengthen its life. Learn the techniques of sharpening each tool and practice them frequently. Professional gar-

deners often carry sharpening stones or files and sharpen their tools every hour or so while working.

Clean tools after each use. One effective method is to keep a five-gallon bucket filled with sand and used motor oil in the tool shed. At the end of the gardening day, remove clinging dirt from tools by plunging them into the oily sand several times. This will keep the tools cleaned and oiled, and will help prevent rusting.

Perhaps the most important step in tool care is to put tools in their proper place. Tools left in the garden will rust and break and can be a safety hazard. Some gardeners paint handles with a bright color to make their tools easy to spot.

III. Cultivation Practices

A. Types of Soil Cultivation

1. Plowing—It once was assumed gardens should be turned yearly with a moldboard plow, mostly for weed and pest control. While garden plowing is still a common practice, turning the soil over completely has been found to be detrimental in some cases. It can cause soil compaction, upset balances of microorganisms, and bury layers of coarse organic material below the influence of insects and microbes, which would otherwise cause the materials to decompose.
2. Chisel plowing—This does not have this disruptive effect, is one alternative, but it is limited to sandy or loamy soils. Many gardeners do not have chisel plows. In addition, gardeners in non-rural areas have trouble finding a person who will plow and disk a garden for a reasonable price.
3. Rototilling—Most home gardens' soil condition is sufficient, as long as plant debris is not excessive. Rotary tilling mixes rather than turns the upper layers of soil. One possible harmful effect of rototilling is the formation of a compaction layer just beyond the reach of the tines. Use of deep-rooted cover crops or double digging can help prevent or alleviate this problem.

4. Hand cultivation—By spading the soil deeply until it is loose and drains easily, prepares the soil.

B. Cultivation Time

Fall tillage has several advantages over the traditional spring plowing. It allows earlier spring planting, since the basic soil preparation is already done when spring arrives. Turning under large amounts of organic matter in fall is likely to result in better decomposition because autumn temperatures are higher than those in early spring, and the process has more time to take place. Insects, disease organisms, and perennial weeds may be reduced by killing or inactivating them through burial or exposure to harsh winter weather. The physical condition of heavy clay soils may be improved by the alternate freezing and thawing, which break up hard clods. Fall tilling alone is not recommended for hillside or steep garden plots since the soil is exposed all winter and is subject to erosion when spring rains come.

If a winter cover crop is grown to improve soil and to prevent erosion, the ground will have to be tilled in the fall to prepare the soil for seed and again in spring to turn under the green manure. A cover crop decreases erosion of the soil during the winter, adds organic material when it is incorporated in the spring, improves soil tilth and porosity, and adds valuable nutrients.

Spring tillage is better for sandy soils and those receiving shallow tilling. Generally, most gardens must be disked or rotary tilled in the spring to smooth the soil for planting.

C. Cultivation Requirements

Work the soil only when the conditions are right. Pick up a handful of soil and squeeze it. If the soil crumbles freely, it should be about right. Take samples at the surface and at a 2- to 3-inch depth at several locations in the garden plot. If the soil is powdery or in clumps, it may be excessively dry and difficult to work. If soil sticks to a shovel, or if the turned surface is shiny and smooth when spaded, it is still too wet. Working soil when excessively wet can destroy soil structure, which may take years to rebuild. Plowing with a tractor when soil is wet is espe-

cially damaging. It causes the formation of a compaction layer that will inhibit root growth. Soils with adequate humus levels generally make cultivation easier because of their improved structural qualities.

Just before planting, break up large clods of soil and rake the bed level. Small-seeded vegetables germinate best in smooth, fine-surfaced soil. Do not pulverize seedbed soil. This destroys the structure and promotes crusting and erosion problems.

Any addition to the soil that improves its physical or chemical condition is considered a soil amendment. Many types of amendments are available to the home gardener.

Further Reading

University of Idaho Extension

PNW 320 Calibrating and Using a Backyard Sprayer

CIS 1054 Low Input Landscaping

CIS 1065 Improving Sprayer Accuracy: Simple Methods for Correct Calibration

CIS 858 Using Bark and Sawdust for Mulches, Soil Amendments, and Potting Mixes

EXT 726 Weed Control in the Home Garden