

Vegetables Are Appealing If You Don't Mind the Work

By Allan Stoner and Norman Smith

Growing vegetables is often an excellent way to make the best use of a few acres. Using all or part of your land to grow vegetables may be appealing regardless of whether you intend to derive pleasure or profit from the property. But keep in mind that while most gardeners can grow vegetables for fun, growing them as a money-making venture is a serious business requiring many talents and skills.

If it is important to earn income from the land, raising vegetables may seem just the thing since most of them yield a large return per unit of area. On the other hand, vegetables require a lot of work and should not be tried unless adequate labor is available and you are willing and able to put forth the effort to properly manage the planting during the growing season.

Before deciding to grow vegetables on your few acres, determine suitability of the land for vegetable production. Most vegetables grow best in a slightly acid, fertile, well-drained soil. However, soil acidity and fertility can be altered by adding fertilizer and lime, while poorly drained soils can be tilled to improve drainage.

Without exception, vegetables grow best in full sunlight. Easy access to an abundant supply of high quality water is also important or even essential in some areas.

Length of the frost-free growing season, and the temperature throughout the season, may have a bearing on the feasibility of growing vegetables.

If you intend to make a profit growing vegetables, one of your first concerns should be how to market your produce. First, a distinction should be made between crops grown for fresh market and those grown for processing.

Allan Stoner is a Research Horticulturist, U.S.
Department of Agriculture. Norman Smith is
Cumberland County Agricultural Agent, Bridgeton, N.J.

Most of the processing crops are grown on large acreages so that they can be machine-harvested. A small-scale farmer using small machines or hand labor finds it very difficult to compete with these large mechanized farms. Ten years ago you could grow a few acres of tomatoes for a local processor and make \$100 to \$200 per acre, but rarely is this possible today.

In contrast, vegetables for fresh consumption often can be grown by a small-scale farmer-grower or by a larger farmer using mostly hired laborers.

Some of the most popular vegetables for fresh consumption include sweet corn, tomatoes, peppers, summer squash (yellow and green), cucumbers for slicing or pickling, snap beans, lima beans, eggplant, acorn and butternut squash, okra, muskmelons and watermelons. Also popular are the salad crops including cabbage (green, red and savoy), lettuce (iceberg, leaf,



Greenhouse tomatoes grown in peat vermiculite mix in troughs (left) may be profitable for home retail sales if fuel costs can be held down. Plastic tunnels (below) protect tomatoes from wind outdoors, and help produce earlier crops.

Vincent Abbatiello



Boston, bibb, romaine, escarole and endive), collards, kale, parsley, beets, and carrots.

Marketing fresh vegetables can be a large or small venture depending on your crops and method of selling. If your farm is a long way from the consumer you may choose to sell through a broker-shipper who buys your crop and sells it to a chain.

For successfully selling directly to a chain store, you have to be a large grower or located in an area with many smaller growers so that you can pool a large volume of mixed vegetables for sale to a buyer. Your returns from this type of selling will be about 25% of what you see the vegetable selling for in your local grocery.

Selling direct to the consumer gives you the opportunity to acquire a larger share of his dollar and is likely to be simpler for many small farmers. You can do this with a pick-your-own operation, a roadside stand, local deliveries to smaller stores or other roadside stands, or by organizing a city retail market.

Large chain stores are not likely to buy much local produce, so don't plan on a large store next to your farm as a customer. Their marketing techniques are not geared to working with small producers since they handle large quantities in trailer-load lots from production areas where they can obtain a dependable supply of a known quantity and quality at very competitive prices.

Roadside Sales

A successful roadside stand can be developed if you are in an area where people like and are willing to pay for fresh vegetables which are often of higher quality than they can buy in their local stores.

The most popular vegetables for roadside sales are sweet corn, tomatoes, and salad crops. An important factor in their popularity is that they are so highly perishable. Roadside marketing makes it possible to reduce the time interval between harvesting and consumption, thus making it possible for the consumer to have the highest possible quality.

Your crop mix for roadside marketing can also include peppers, cucumbers, yellow and green squash, new potatoes, cabbage, muskmelons, watermelons, beets, carrots and cauliflower. Strawberries also fit into roadside marketing as do pumpkins grown for the Halloween trade, Indian corn, and some winter squash.

When developing a pick-your-own operation, give thought to what vegetables are best suited to this system. Since many inexperienced people will be harvesting, crops that are easily

harvested and do not require difficult decisions on their being at the proper stage for harvesting are best adapted to pick-your-own. Tomatoes, snap beans and cucumbers are examples.

On the other hand, some experience is required to be able to determine when sweet corn is at the proper stage of maturity for harvest. Therefore, unknowledgeable people harvesting corn can cause significant damage to a planting and still not end up with high quality produce.

Once you have decided to grow vegetables and how you will market them, consider what crops will grow well in your area, the potential demand, the likely monetary return from each, and what specific varieties are best adapted to your area.

If you plan to grow several vegetables, a comprehensive plan for using the available space and the planting sequence should be developed before putting in the first seed. Also decide what might be grown in future years so a crop rotation system can be developed.

If space is limited, you will probably want to grow crops that will give the largest return per unit of area. Examples are tomatoes, peppers, summer squash, and cucumbers. On the other hand, sweet corn, pumpkins and winter squash need a great deal of space and may not be good crops to grow.

Unending Harvest

Sound planning before the time to plant can result in a continuous harvest throughout the season. One way to use space effectively is to make a sequential planting of crops with different temperature requirements and/or different rates of maturing.

For example, an early crop of lettuce, cabbage or other cool season vegetable can be followed by snap beans or summer squash. These in turn can be followed by another planting of the cool season crops, such as cabbage and lettuce.

Continuous harvests of a single crop can be achieved by successive plantings of the same variety at a regular interval, such as every two weeks. The same result may be achieved by simultaneously planting several varieties of a crop that are known to mature at different rates.

Use cultural practices that will let you minimize the amount of labor required. These might include the use of various mulches, herbicides, or drip irrigation.

Mulches can significantly lessen weed problems and reduce the need for other weed control methods. They also can result in warmer soil, thus earlier crop maturity, conservation of moisture, and reduced disease.

Suggested plant spacing, number of seeds or plants required, and average yield of the common vegetables

Vegetable	Spacing (Inches)		Plants or seed per 100 feet	Average yield expected 100 feet
	Rows	Plants		
Asparagus	36-48	18	66 plants or 1 oz.	30 lb.
Beans, snap bush	24-36	3-4	½ lb	120 lb.
Beans, snap pole	36-48	4-6	½ lb	150 lb.
Beans, lima bush	30-36	3-4	½ lb	25 lb. shelled
Beans, lima pole	36-48	12-18	¼ lb.	50 lb. shelled
Beets	15-24	2	1 oz.	150 lb.
Broccoli	24-36	14-24	50-60 plts or ¼ oz.	100 lb.
Brussels Sprouts	24-36	14-24	50-60 plts or ¼ oz.	75 lb.
Cabbage	24-36	14-24	50-60 plts or ¼ oz.	150 lb.
Cabbage, Chinese	18-30	8-12	60-70 plts or ¼ oz.	80 heads
Carrots	15-24	2	½ oz.	100 lb.
Cauliflower	24-36	14-24	50-60 plts or ¼ oz.	100 lb.
Celery	30-36	6	200 plants	180 stalks
Collards & Kale	18-36	8-16	¼ oz.	100 lb.
Corn, sweet	24-36	12-18	3-4 oz.	10 doz.
Cucumbers	48-72	24-48	½ oz.	120 lb.
Eggplant	24-36	18-24	50 plts or ⅛ oz.	100 lb.
Kohlrabi	15-24	4-6	½ oz.	75 lb.
Lettuce, head	18-24	6-10	¼ oz.	100 heads
Lettuce, leaf	15-18	2-3	¼ oz.	50 lb.
Muskmelon (cantaloup)	60-96	24-36	50 plts or ½ oz.	100 fruits
Okra	36-42	12-24	2 oz.	100 lb.
Onions	15-24	3-4	400-600 sets or 1 oz.	100 lb.
Parsley	15-24	6-8	¼ oz.	30 lb.
Parsnips	18-30	3-4	½ oz.	100 lb.
Peas, English	18-36	1	1 lb.	20 lb.
Peas, Southern	24-36	4-6	½ lb.	40 lb.
Peppers	24-36	18-24	50 plts or ⅛ oz.	60 lb.
Potatoes, Irish	30-36	10-15	6-10 lb. of seed tubers	100 lb.
Potatoes, sweet	36-48	12-16	75-100 plts	100 lb.
Pumpkins	60-96	36-48	½ oz.	100 lb.
Radishes	14-24	1	1 oz.	100 bunches
Spinach	14-24	3-4	1 oz.	40-50 lb.
Squash, summer	36-60	18-36	1 oz.	150 lb.
Squash, winter	60-96	24-48	½ oz.	100 lb.
Tomatoes	24-48	18-36	50 plts or ⅛ oz.	100 lb.
Turnip, greens	14-24	2-3	½ oz.	50-100 lb.
Turnip, roots	14-24	2-3	½ oz.	50-100 lb.
Watermelon	72-96	36-72	1 oz.	40 fruits

Organic materials such as straw and leaves or specially manufactured polyethelene or paper products can be used as mulches.

Recent research shows that aluminum foil or aluminum-coated paper provide the usual benefits of other mulches, plus they may act as insect repellants.

Herbicides, or chemical weed killers, may be valuable to a small-scale operation. However, no one herbicide is effective or legally approved for use on all vegetables. Thus care must be taken to use only those chemicals approved for weed control for a given crop.

Early set on Harris hybrid Red Pak tomatoes growing on black mulch film (right). Squash growing through foil-covered rows helps control virus more effectively (below), without need for aphid control sprays.



Vincent Abbatiello



Using a material not labeled for a crop is unlawful. This can damage the crop and pose a possible problem to the people consuming it. Strict adherence to instructions on the container label is essential.

Drip or trickle irrigation is a watering technique that has evolved in recent years. It involves use of plastic pipe or hose laid very near a row of plants. The pipe or hose has minute holes which allow water to gradually seep out and wet the area immediately around the plants.

This provides a continuous supply of water to the crop and delivers the water to where it is of greatest use. Drip irrigation also greatly reduces the amount of water required to grow a crop—which is particularly valuable in arid areas.

The drip system is especially effective when combined with use of paper or polyethylene mulch. The irrigation hose is centered under the mulch along the plant row. Thus the mulch reduces water loss due to evaporation from the soil surface.

Plant Pests

Keep a sharp eye out for insects and diseases or you may lose all or part of the crop in a short time, or suffer from a poorer quality crop.

Information to help you identify these pests and describing control methods can be obtained from textbooks, USDA and State Agricultural Experiment Station publications and per-

Drip irrigation system on onions will wet an area 2 to 3 feet wide below the soil surface when placed near rows.

Vincent Abbattello



sonnel, county Extension agents, and agricultural supply agents. Many farmers will visit with you about their experiences and can be a tremendous help on local crop requirements.

The type equipment you need to grow vegetables on a few acres depends in large part on the size of operation you envision. Basically you need some means of preparing the land for planting, of tilling or cultivating during the season, and of applying fertilizer and controlling pests. It may also be desirable to have mechanical equipment available for seeding and/or transplanting. A wide variety of equipment is available for all sizes of farming operations.

Modern farm equipment is extremely expensive, and should not be purchased if you can hire the job done for less. For a small acreage you may find it advantageous to hire another farmer to do your plowing and soil tillage and then buy a new or used small farm tractor for the row crop work of cultivating and spraying.

Most small tractors designed for mowing lawns are not powerful enough to plow satisfactorily, and do not have enough clearance to permit driving over a partially or fully grown crop row for spraying, cultivating, etc. At least a 30 horsepower tractor is needed to plow 9 inches deep to turn over the soil properly and make a good seedbed.

A small heated and ventilated greenhouse is essential if you want to grow transplants for earlier planting. You can advance your harvest season by several weeks if you raise your own transplants of tomatoes, peppers, melons, cabbage and lettuce. It takes about six to eight weeks to grow transplants of peppers, tomatoes, cabbage and lettuce. Melon plants are ready for field planting in three weeks.

An inexpensive greenhouse can be built by covering a pipe frame with polyethelene.

The foregoing gives general information on requirements for growing vegetables for your gratification or for developing a small venture for profit, either on your own or in combination with neighboring farmers.

At the other extreme let's discuss a highly organized group of experienced vegetable growers who strive to obtain maximum production and superior quality of their vegetables through their own efforts and with the benefit of expert advice by Extension Service and their State University. They are favored by good soils and water resources, plus a long growing season. But their ultimate returns are determined by an auction market where prices vary daily according to supply and demand.

In this highly competitive situation each grower must produce higher than average yields to cover expenses and make a satisfactory return on his investment. If yields are reduced by mistakes or unfavorable weather, or prices are low at harvest time, the grower may incur serious losses.

This example of how vegetable culture on small-scale farms can be successful is illustrated by the Vineland area of Southern New Jersey where there are several hundred small vegetable farms ranging from 4 to 60 acres. Gross income from these farms is from \$1,500 to \$5,000 per acre, depending on crops grown, yields, and fluctuating prices.

These farms are concentrated in southern New Jersey for three key reasons:

- The climate, fresh well water, and soil type are suitable for a planting season that extends from late February to August and a harvest season from April through November
- A cooperative auction marketing system was developed in the 1930's known as the Vineland Produce Auction Cooperative. There the farmers sell most of their fresh vegetables daily to buyers for shipment to the over 100 million consumers in the Northeastern United States and Canada that are within 24 hours driving distance by truck
- The farmers use very intensive production technology which has been developed through the support of the Cooperative Extension Service with Rutgers University-Cook College, the U. S. Department of Agriculture, and Cumberland County

New back-up technology is developed each year by the Cook College staff and the local Extension agents in cooperation with farmers. A book of annually revised recommendations is given to growers before each season begins. The back-up agribusiness group in the area includes a number of seed, fertilizer, lime, pesticide, farm equipment and packaging suppliers, repairmen, brokers and truckers to buy, sell and deliver the fresh produce to city stores.

Credit is provided by many local banks who are farmer-oriented and by the Production Credit and the Federal Land Bank and by the Farmers Home Administration. The pay-back record of these New Jersey farmers is excellent.

Fresh vegetable sales from small farms at the Vineland Cooperative Produce Auction have progressed from \$1 million in 1960 to \$3.5 million in 1966 to \$20.25 million in 1977. Another \$5 to \$10 million was sold in 1977 to surrounding markets by direct sales or to roadside stand buyers. This growth is an excellent indicator of the successful small farmer enterprises which exist in the South Jersey area.

On the average the farmer receives about 25% to 30% of the consumer's dollar for vegetables sold through the auction market. The other 70% pays for brokerage fees, assembly, hauling, prepackaging, refrigeration and storage, warehouse ownership and operation, selling to stores, and finally selling to consumers.

At the Vineland Produce Auction a buyer can load a trailer with as many as 40 different vegetables on a single day. The mixed trailer load of high quality fresh vegetables is paramount to the success of vegetable production in this area with the buyers' ability to send it where needed by the consumer within 24 hours.

An individual vegetable farmer has little control over the price he receives, except as affected by quality. At an auction market the buyers bid competitively to obtain what they need that day to satisfy their store customers. If the local supply harvested by the farmers is more than needed by the buyers, prices are low. If market demand is high and the supply moderate, prices are bid higher. If an item is in high demand and scarce, prices go even higher.

A major factor in price determination is the supply of the vegetables in the whole country. For example, when farmers in South Jersey are harvesting lettuce in June and October, the supply and quality in the Far West affects the price the farmer receives in New Jersey. Pick-your-own, roadside or other means of selling directly to consumers are not as greatly affected by nationwide supply and demand.

Besides the knowledge and skills required to grow vegetables and care for machinery, personnel management skills are needed to work with labor in order to keep workers productive and happy.

Business skills are required to sell, to borrow money (short and long term), and for record keeping for income tax, social security, unemployment insurance, workman compensation, budgeting and analysis.

This job is often done with the help of the farm wife or another family member.

Pesticides

All New Jersey farmers who use restricted pesticides must pass a test by the State Department of Environmental Protection and be licensed by the state to use pesticides on their farm. Other states have similar licensing procedures.

Without this license, farmers cannot purchase the effective pesticides needed to produce quality vegetables. Low

quality, diseased and insect-infested produce would be rejected by the buyers and consumers.

Vegetable growing is the main activity of many of New Jersey's small vegetable farmers. It can be a full-time, year-round job which provides sufficient income for their family.

The busiest season is from March through November. During summer the work day may begin at 6 a.m. and end at dark. This usually goes on seven days a week since vegetables need harvesting every day on a farm where a variety of vegetables are grown. A very limited time is taken for church and social activities in the growing season.

During winter the small farmer is busy maintaining and repairing machinery, expanding or repairing buildings, constructing or maintaining greenhouses and growing plants for the next season.

Labor in the small acreage vegetable farm includes family members, local teenagers, and skilled and semi-skilled labor brought in from other areas. About three-quarters of the work on a small vegetable farm is hand harvesting, bunching, and packaging the vegetable for market. The rest of the time is spent in production and maintenance.

To sum up, the use of all or part of your small acreage for producing vegetables can be enjoyable and profitable. Even though growing vegetables takes a lot of work and is beset with a host of possible problems, the potential for high return per acre makes vegetable culture particularly suitable for small acreages.

The beginner will soon discover there is no right or wrong way to grow and market vegetables.. He must learn to anticipate new situations and change his methods to deal with them.

Further Reading:

U. S. Department of Agriculture, *Home Garden Vegetables*, Part 2 of 1977 Yearbook of Agriculture, pp. 102-244, on sale by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. \$6.50.