

THE TENNESSEE VEGETABLE GARDEN

HARVEST, HANDLING AND STORAGE OF VEGETABLE PRODUCE

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*Garden vegetable production is increasingly popular for Tennessee residents. The value of home gardens includes financial and nutritional benefits resulting from the provision of fresh vegetables as well as enhancing personal health and well-being through gardening activities. However, a basic understanding of soils, site selection and crop maintenance is required before a gardener can take full advantage of the benefits of home vegetable production. To meet these needs, this series of fact sheets titled **The Tennessee Vegetable Garden**, has been prepared by UT Extension to inform home gardeners and propel them to success in residential vegetable production.*

GROWING HIGH-QUALITY VEGETABLES IN OUR GARDENS

A commonly cited reason for home gardening is providing high-quality vegetables for gardeners and their families. The term quality can have various meanings, including appearance, nutritional composition, increased shelf-life and the many facets of flavor. Here we will discuss quality in broad terms that can relate to all of those aspects. Garden vegetables will be of the highest quality when harvested at the proper time. Some of the main considerations for the home gardener are finding the best time to harvest and using handling and storage practices that deliver

vegetables to the table as close as possible to the condition they were in the garden.

There is an entire field of science dedicated to maintaining quality through the food chain from farm to fork. As home gardeners, the task is much simpler because long-distance transport is not required. The main areas of concern are picking at the proper time and proper handling and storage between the garden and table.

HARVESTING VEGETABLE CROPS

SELECTING THE DAY OF HARVEST

To produce vegetables that are of the highest quality, proper fertility, water management and pest control are

needed. These topics are covered in other UT Extension fact sheets in this series. This discussion will focus on determining proper maturity so that harvesting can be done at the peak of quality. Some types of produce are best when allowed to fully mature on the plant while others are best before peak maturity. Remember that maturity to the plant means producing seeds to reproduce, and gardeners sometimes prefer to eat fruit that does not have mature seeds. For most leafy vegetables, the highest eating quality occurs before flowering or seed production begins. Table 1 (page 3) provides information on vegetable appearance and other indicators of optimum maturity to aid in picking in the home garden. Picking time can depend on uses or personal preferences, and some notes are also included on factors that may impact picking time.

HARVEST TIMING AND PRACTICES

For most crops, the best time to harvest is in the morning. Use caution,

though, in picking when plant leaves are still wet due to the potential for spread of plant diseases. Daytime heat and sunlight often lead to loss of water in the plant leaves and fruit, so water content will be at its peak in the morning. If picking must be done in the heat of the day, protect all harvested products from direct sun while in the garden and transport them to a cooler location as quickly as possible. Removing “field heat” quickly will help them maintain quality and store longer.

Use care in harvesting to protect both plants and produce. Many vegetable crops will be harvested multiple times, and protecting plants and vines will support future production. Do not step on or crush vines, and remove fruit gently to prevent injury to stems or leaves. Some fruit, such as peppers, should be cut from the plant to reduce the chance of damage to the plant by pulling fruit to harvest.

Care in handling produce is also essential. Tomatoes and other soft crops (especially those harvested extremely ripe) should be carefully

packed in boxes one layer deep to prevent crushing and bruising. The short stems of tomatoes also can be removed to prevent puncture wounds on surrounding fruit. Root vegetables, such as potatoes, should be dug carefully to prevent damage that could reduce storage life. Additionally, timely picking of fruit will enable the plant to direct sugars to small, developing fruit and support ongoing production.

FOOD SAFETY IN THE HOME GARDEN

Harmful microorganisms, also known as pathogens, can be found on produce. When growing crops — even on a small scale — we should be aware of how our practices can impact food safety. The primary areas we seek to control are water, cleaning and sanitation of packing tools and containers, wild and domestic animals, and manure application. Water used for washing produce after harvest and in cleaning tools and containers for harvest should be potable or drinking



Figure 1. This zucchini is about 6 inches in length, still glossy and ready for harvest. Delay by only a day or two will result in a much larger fruit that is lower in quality.



Figure 2. Maintaining crop quality depends on environmental conditions and handling soon after harvest. Lettuce and many other crops with high water content need to be stored in a cool place with high humidity soon after harvest to prevent water loss from tissues and loss of quality.

quality. Examples include well water or that delivered by a municipality. You should also clean tools and containers used for harvesting, especially if they will touch the edible portion of the crop. See UT Publication [PB 1420](#) for specific practices. Containers can be washed with a mild detergent, rinsed with water and sanitized with an over-the-counter compound like plain bleach. Wild and domestic animals can be a source of foodborne pathogens, even if they are healthy. You should try and keep wildlife and your pets out of the garden and do not harvest any produce in a 5-foot radius around any feces. Any manure used to amend the soils should be composted in a manner that is sufficient to control potential pathogens. Details on the proper composting of manure can be found in resources listed below.

HOME STORAGE OF VEGETABLE GARDEN PRODUCE

WHAT IS HAPPENING DURING STORAGE?

Just because a vegetable has been picked and stored does not mean that biological processes stop. In fact, respiration, which is the breakdown of stored sugars and other compounds,

continues to provide energy for biochemical processes. The goal of storage is to slow respiration to extend shelf life and quality. High temperatures, high oxygen levels, immaturity and tissues with high water content tend to increase respiration. Additionally, leaves and fruit will also lose water. So, storage is intended to slow respiration and prevent water loss. To maintain optimum quality, different types of produce require different storage conditions (see Tables 1 and 2).

Only store vegetables of high quality. If produce is damaged or diseased, storage life will be reduced and such produce can reduce the quality and storage life of nearby fruits and vegetables. An overview of different storage groupings are listed in Table 1 below.

PRESERVATION OPTIONS FOR VEGETABLE GARDEN PRODUCE

CANNING

Canning allows for extended storage of vegetables at room temperature. The basic principles of canning apply high temperatures in a pressure canner or water bath in order to inactivate

enzymes and microorganisms that would otherwise deteriorate the produce. Canning practices vary based on the acidity of the food and several other factors. See UT Extension Publication PB 724, “Canning Foods,” for a full description of canning methods and practices.

FREEZING

Freezing home garden vegetables can be an excellent method of preserving nutrients, colors and flavors in the garden produce. It is important to only freeze high-quality produce that is free from damage and disease. Simply freezing produce will not always destroy harmful microorganisms, called pathogens, so preparation and handling as well as proper freezer temperatures are essential. Please see UT Extension Publication PB 1483, “Freezing Foods,” for a full description of freezing methods and practices.

DRYING

Many types of fruits and vegetables can be dried, including beans and tomatoes. Some dried foods are rehydrated before consumption and some are not. Drying methods can be as simple as sun drying or may involve a dehydrator. Proper pretreatment and post-treatment are important to maintain safe and high-quality dried foods. Please see additional information for sources of drying instructions for garden vegetables.

Table 1. General groupings of storage conditions in the home. (This table is revised from UT Extension publication SP 291-L.)

	Group 1	Group 2	Group 3	Group 4
Conditions	<i>Cold and moist (32-40 F and 85-98% humidity)</i>	<i>Cool and moist (45-55 F and 85-95% humidity)</i>	<i>Moderate temperature (50-60 F)</i>	<i>Room temperature (60-75 F)</i>
Additional comments	<i>The most common household location to achieve these conditions is the refrigerator crisper drawer – often in permeable plastic containers. Fruits such as muskmelon, pears, peaches, plums and apples should not be stored with many crops in groups 1 and 2 because they produce a hormone (ethylene) as they ripen that will speed deterioration in other produce.</i>	<i>These crops are sensitive to chilling injury. Due to difficulty in providing these conditions, most gardeners store these crops in a home refrigerator for a short period.</i>	<i>Spaces used to provide these conditions for the home gardener are often a pantry, basement or insulated garage.</i>	<i>Remember to keep produce out of direct sunlight when storing at room temperature.</i>

Table 2. Signs of maturity and readiness for harvest from the home garden in a range of common vegetable crops.*

Crop	Appearance when ready to harvest	Harvest comments	Storage group	Storage life**
<i>Beans, snap</i>	<i>While pods snap easily (as opposed to being tough and flexible) and seeds are still green.</i>	<i>Some prefer the taste of more mature beans in the pod.</i>	<i>Group 2</i>	<i>Less than 2 weeks</i>
<i>Beets</i>	<i>Often roots 1 ½ to 3 inches in size have the highest quality.</i>	<i>Remove tops for storage as they can increase water loss.</i>	<i>Group 1</i>	<i>Up to 4 to 6 months</i>
<i>Broccoli</i>	<i>When flower buds are still dark or bright green (no yellow) and are tight (have not begun to open).</i>	<i>Stem broccoli may be harvested earlier.</i>	<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Cabbage</i>	<i>When heads become firm and heavy and it is harder to compress leaves.</i>		<i>Group 1</i>	<i>Up to 1 to 2 months</i>
<i>Carrots</i>	<i>When roots are of appropriate size, firm and brittle. Tops are often about 1 inch in diameter.</i>	<i>In late fall carrots can also be “stored” in the ground before harvest for a few weeks before hard freezes.</i>	<i>Group 1</i>	<i>Up to 4 to 6 months (mature, topped)</i>
<i>Cauliflower</i>	<i>Harvest while curds are still white (before discoloring) and are not loose.</i>	<i>Heads are mostly white at maturity and may be yellow or brownish if over mature.</i>	<i>Group 1</i>	<i>Up to 1 month</i>
<i>Collards</i>	<i>When leaves are large enough to eat but still firm and green.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Corn, sweet</i>	<i>Kernels should be filled out nearly to the end of the ear and milky if crushed. Silks dried down.</i>	<i>The window of harvest time can vary between sugary, supersweet, etc.</i>	<i>Group 1</i>	<i>Less than 1 week</i>
<i>Cucumber</i>	<i>When seeds are small, flesh is still firm, and color is green rather than yellow.</i>	<i>Harvest frequently, especially for small (4- to 6- inch) cultivars. Over mature fruit left on plant can reduce yield.</i>	<i>Group 2</i>	<i>Less than 2 weeks</i>
<i>Eggplant</i>	<i>When fruit is still shiny and the color has not dulled. Edible from 1/3 grown until full grown.</i>	<i>Fruit left on plant can slow development of later fruit.</i>	<i>Group 2</i>	<i>Less than 1 week</i>
<i>Kale</i>	<i>Leaves can be harvested at a range of sizes. Often cultivars are selected based on the need for full-sized or baby leaves.</i>	<i>Many times leaves are harvested frequently rather than a one-cut harvest.</i>	<i>Group 1</i>	<i>Up to 2 to 3 weeks</i>
<i>Kohlrabi</i>	<i>When stems have reached 2 inches or more in diameter and still tender and crisp.</i>	<i>Some cultivars are better than others at maintaining crisp texture with increasing size.</i>	<i>Group 1</i>	<i>Up to 2 to 3 months</i>
<i>Lettuce, leaf</i>	<i>Can be harvested at any size desired for eating. Tender and mild flavor will be more likely when picked before flowering.</i>	<i>Thinning the plants can produce sequential harvests from the same row.</i>	<i>Group 1</i>	<i>Less than 2 weeks</i>

Table 2 (continued)

Crop	Appearance when ready to harvest	Harvest comments	Storage group	Storage life**
<i>Lettuce, head</i>	<i>When inner leaves form a head but before tipburn or any damage occurs on the young inner leaves.</i>	<i>Some cultivars are intended to perform as mini heads, so harvest size varies.</i>	<i>Group 1</i>	<i>Up to 2 to 3 weeks</i>
<i>Muskmelon</i>	<i>When melons can be lifted and the vine pulls away from the fruit with little resistance (slips).</i>		<i>Group 1 or 4 to protect other crops from ethylene</i>	<i>Less than 2 weeks</i>
<i>Mustard greens</i>	<i>When leaves are crisp, firm and the size desired for eating.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Okra</i>	<i>When pods are 2 ½ to 3 ½ inches long and tender.</i>	<i>Proper harvest intervals will support production of more pods. Will likely be needed every 2 to 3 days.</i>	<i>Group 2</i>	<i>Less than 2 weeks</i>
<i>Onion</i>	<i>Green onions: When bulb is ½ to 1 inch in diameter. Storage onions: After tops have dried down.</i>	<i>Dry onions are best stored around 32 F under 60-70% humidity. In the home, they can be left at room temperature.</i>	<i>Group 1 – green onions See comments for dry onions.</i>	<i>Less than 1 month green Up to several months dry.</i>
<i>Peas, snap</i>	<i>After pods form but before yellowing. Often more tender at a small size.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Peas, English</i>	<i>After pods fill but before yellowing.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Pepper</i>	<i>When full size and still firm. Peppers are immature when green and will color and contain more sugars when ripe.</i>	<i>Cutting pepper fruits off plant during harvest can prevent plant damage. Allowing peppers to fully color on the plant can expose fruit to higher pest or disease risks.</i>	<i>Group 2 (Can cause off flavor in other produce if not in a bag in storage.)</i>	<i>Up to 2 to 3 weeks</i>
<i>Potato, Irish</i>	<i>For immediate use: Harvest any time tuber is of adequate size. For storage: Harvest after vines have dried and died down and skin has set.</i>	<i>Potatoes should never enter storage with any moist soil on the skin. Keep away from sunlight to prevent greening.</i>	<i>Group 4 for short-term use or Group 3 for storing longer term</i>	<i>Up to 4-5 months but can vary with conditions</i>
<i>Potato, sweet</i>	<i>After reaching desired size, but before moist and cool fall soil conditions reduce quality and storage life.</i>	<i>Curing is needed for long-term storage (5-10 days at 80-85 F and 80-90% humidity).</i>	<i>Group 3</i>	<i>Up to 4 to 6 months when cured</i>
<i>Pumpkin</i>	<i>After they are fully grown and colored but before frost.</i>		<i>Group 3</i>	<i>Up to 2 to 3 months</i>
<i>Radish</i>	<i>When firm and brightly colored but less than 1 ½ inches in diameter. Attaining large sizes often creates a pithy or less firm root.</i>	<i>Often a short harvest window, so sequential planting may be needed.</i>	<i>Group 1</i>	<i>Less than 1 month</i>
<i>Spinach</i>	<i>When leaves are of desired size, crisp and still dark green.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>

Table 2 (continued)

Crop	Appearance when ready to harvest	Harvest comments	Storage group	Storage life**
<i>Squash, summer</i>	<i>When skin is still tender and glossy and the large end (zucchini) is 1 to 2 ½ inches in diameter.</i>	<i>Smaller squash are often more tender for fresh eating.</i>	<i>Group 2</i>	<i>Less than 2 weeks</i>
<i>Squash, winter</i>	<i>When rind has hardened and is not easily scratched with a fingernail.</i>	<i>For long-term storage, the fruit need to ripen on the plant.</i>	<i>Group 3</i>	<i>Up to several months, depends on type</i>
<i>Tomato</i>	<i>When fully or uniformly colored (pink to orange) but still somewhat firm.</i>	<i>Heirloom cultivars may have thinner skins and flesh that is not as firm, so picking time and practices can vary.</i>	<i>Group 3 or 4</i>	<i>Less than 2 weeks</i>
<i>Turnip root</i>	<i>Generally after they reach 2 inches in diameter, but while still tender.</i>	<i>A slight freeze may improve flavor.</i>	<i>Group 1</i>	<i>Up to several months</i>
<i>Turnip green</i>	<i>When leaves are green and crisp, size can vary.</i>		<i>Group 1</i>	<i>Less than 2 weeks</i>
<i>Watermelon</i>	<i>When tendrils next to fruit die back and the rind on the underside of the fruit turns from white to a creamy yellow.</i>	<i>Also a dull sound when snapped can be an indicator of maturity, but this may take some practice.</i>	<i>Group 2 or 4</i>	<i>Up to 2 to 3 weeks</i>

**This table contains information from UT Extension publications SP 291-L, PB 901, SP 768-F, and the 2016 Vegetable Crop Handbook for Southeastern United States Table 14.*

*** Storage life is based on estimates for commercial crops. Home storage conditions may reduce storage life because of the inability to provide all produce optimal conditions.*

ADDITIONAL RESOURCES

UT Extension Publication PB 1420 “A quick consumer guide to safe food handling.”
extension.tennessee.edu/publications/Documents/PB1420.pdf

UT Extension publication PB 724 “Canning Foods.”
trace.tennessee.edu/cgi/viewcontent.cgi?article=1000&context=utk_agexfood

Compost and Manure Food Safety — UC Cooperative Extension Publication 31-079C
ucanr.edu/sites/placernevadasmallfarms/files/135458.pdf

Food Safety in the Home Garden — UC Davis.
anrcatalog.ucanr.edu/pdf/8366.pdf

UT Extension publication PB 1483 “Freezing Foods.”
trace.tennessee.edu/cgi/viewcontent.cgi?article=1002&context=utk_agexfood

So easy to preserve, University of Georgia
setp.uga.edu

UT Extension Publication SP 768-F “Storage of Fresh Produce.”
extension.tennessee.edu/publications/Documents/SP768-F.pdf

The national center for home food preservation, University of Georgia
nchfp.uga.edu/index.html



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