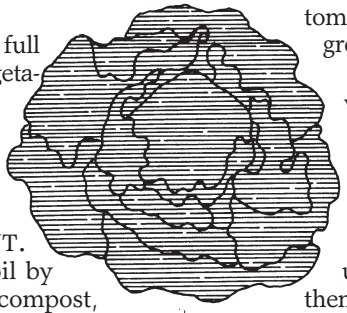
ANR-0479

The Alabama Vegetable Gardener

Planning for the Home Garden

A successful home garden comes with planning and constant attention! Select the site carefully, plant at the right time, use the right amount of fertilizer, use adapted varieties, control pests; then, harvest at the right time.



Site. Select a site with full sun. You cannot grow vegetables in competition with trees or in shade. The soil should be well drained and free of harmful chemicals or debris.

Soil Management. Improve your garden soil by adding organic matter—compost, leaf mold, or well-rotted sawdust—in the late fall.

Lime and Fertilizer. A soil test is the only way to determine lime needs and the best way to figure fertilizer needs. Get information for soil tests at your county Extension office. Test at least every 2 years. For most vegetables the soil pH should be around 6.0 to 6.5. Mix lime into the soil a month or two before planting to be effective.

Long-season crops such as tomatoes, cabbage, pepper, okra, and potatoes need more fertilizer than short-season crops. Close observation is the best guide for additional sidedressing.

Seed and Plants. Seed are inexpensive; get the best available. Don't seed too thickly. Plant small seed, such as turnips and carrots, about ¼ to ½ inch deep. Plant larger seed, such as beans and cucumbers, about 1 inch deep.

Use only stocky, healthy, fresh plants. Set them at the same level they originally grew in the pot. Always water transplants to settle soil around roots. Set tall tomato plants deeper than they grew originally.

Cultivation. To control weeds, cultivate frequently but shallowly. Chemical weed killers are not usually recommended for home gardens. Before using, get full information on how to use and what crop to use them on.

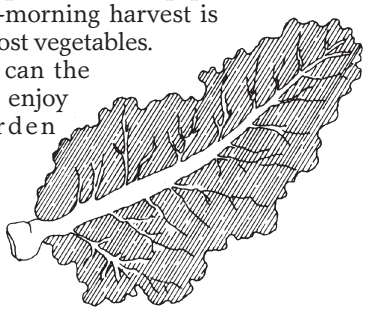
Irrigation. Water is essential for a top-notch garden. During long dry periods, soak the garden thoroughly once a week; don't just sprinkle daily. Light, frequent irrigation helps only during seed germination. Overhead irrigation, especially late in the afternoon, can spread certain diseases. If you use overhead irrigation, do so earlier in the day so plants dry before night. Consider using drip irrigation.

Disease Control. The best practices are rotation, clean seed, resistant varieties (when available), early planting, plowing under old crop debris, and seed treatment. Chemical fungicides, such as chlorothalonil and maneb, may be used to control some common leaf diseases of tomatoes, squash, cucumbers, and cantaloupes. If the garden is heavily infested with nematodes, you might need to move your garden.

Insect Control. For a successful garden, you must control insect pests in a timely manner. Many low-cost insect monitoring traps are available. These pheromone-based traps give accurate information about pest activity and season-long monitoring. Once pest insects are detected and identified, use a three-tiered, integrated pest management (IPM) approach of cultural controls, mechanical barriers, and insecticidal intervention, if needed. Note that all pesticides are poisons and must be used in their prescribed manner to minimize effects to nontarget insects, such as honey bees.

USE ALL CHEMICALS FOR INSECTS, WEEDS, OR NEMATODES ACCORDING TO DIRECTIONS ON THE LABEL. It tells you the amount to use, the crops to use it on, and the days between application and harvest. The label is one of the most important pieces of garden literature. Read and heed it for effective use and safety.

Harvesting. The main reason for having a garden is fresh, high-quality vegetables. Harvest often to get vegetables at the proper stage of maturity. If beans, cucumbers, or okra are left to mature fully, the plant will stop producing. Early-morning harvest is best for most vegetables. Freeze or can the surplus to enjoy your garden all year.



Alabama Vegetable Garden Planning Chart

These planting dates are for Central Alabama. For South Alabama, make spring plantings approximately 10 days earlier and fall plantings 10 days later. In North Alabama, make spring plantings approximately 10 days later and fall plantings 10 days earlier.

Vegetable	Planting Dates Spring	Fall	Seed per 100 Ft. Row	Spacing† (inches)	Average Crop Per 100 Ft.
Beans, snap	April	August 5–20	¾ lb.	36×2-3	120 lb.
Beans, pole	April 10–30	July 20–August 5	½ lb.	36×6-8	150 lb.
Beans, lima	April 10–May 10	July 20–August 5	¾ lb.	36×3-6	25 lb. shelled
Beans, pole lima	April 15–May 15	July 15–August 1	½ lb.	36×6-8	50 lb.
Beets	February	August	½ oz.	30×2	150 lb.
Broccoli		August 1–15	½ oz.	36×18	100 lb.
Brussels sprouts		August 1–September 1	½ oz.	36×18	75 lb.
Cabbage	January 1–February 15*	July 25–August 10	½ oz.	36×12	150 lb.
Cantaloupe	April		1 oz.	60×24	100 fruit
Carrots	March	July 20–September 20	¼ oz.	30×1-2	100 lb.
Cauliflower	January 1–February 15*	July 25–August 10	½ oz.	36×12	150 lb.
Chinese cabbage		August 1–15	½ oz.	36×12	80 heads
Collards	February 1–March 15	August 15–September 15	½ oz.	36×12-18	100 lb.
Corn, sweet	March 10–June 30		8 oz.	36×15	10 doz.
Cucumbers	April 15–May 15	July 1–20	1 oz.	60×24	120 lb.
Eggplants	April 15–May 15*	July 1–20*	50 plants	36×24	100 lb.
Kale		August 15–September 15	½ oz.	36×10	100 lb.
Lettuce	January 15–February*	August 15–September 1	⅛ oz.	30×12	50 lb.
Mustard	February 1–March 15	August 15–September 15	½ oz.	30×2	100 lb.
Okra	April 10–June 30		1 oz.	36×12	100 lb.
Onions		September 15–October 15	½ oz.	30×2-4	100 lb.
	January 15–March 15*		400 plants	30×2-4	100 lb.
Peas, garden	February		1 lb.	36×2	20 lb.
Peas, southern	April–July		½ lb.	42×4-6	50 lb.
Peppers	April 1–May 10*	July*	50 plants	36×24	60 lb.
Potatoes, Irish	February	August 1–15	12 lb.	36×12	100 lb.
Potatoes, sweet	April 10–June 30*		100 plants	42×12	100 lb.
Radishes	February 1–April 1	September 1–October 15	½ oz.	24×1	100 bunches
Spinach	February 15–March 15	September	1 oz.	30×2-3	40 lb.
Squash, summer	April	August 1–15	1 oz.	36×15	150 lb.
Squash, winter	April	July 15–August 1	½ oz.	60×36	100 lb.
Tomatoes	April*	July*	35–50 plants	60×24-36	100 lb.
Turnips	February 1–April 1	August 10–October 1	¼ oz.	30×2	100 lb.
Watermelons	April	June 15–30	½ oz.	96×96	40 fruit

†Between rows x in the row. *Transplant.

A Well-Drained Soil

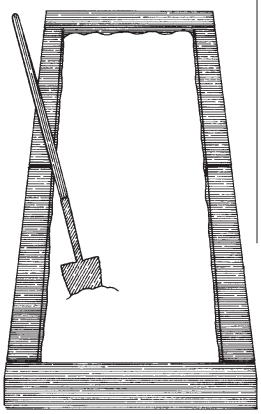
Most gardening publications emphasize that you should locate your garden on a well-drained soil. What is a well-drained soil? What can you do if you have a wet-natured soil or clayey soil that dries out slowly?

Keep in mind that an ideal soil is about one-half air space, one-half solid soil mineral with 2 to 4 percent organic matter. Under ideal growing conditions, about half of the air space will be filled with water. If the soil is too wet, plant roots can't get the oxygen they need. Yes, roots need oxygen just like other organisms. When it's not available, the roots will die. Beneficial soil microorganisms also need oxygen to mineralize nutrients in organic matter and to fix nitrogen for legumes such as beans and peas. When a soil is too wet for the oxygen-loving organisms to function, the anaerobic organisms (those not requiring free oxygen) take over. One group of anaerobic bacteria, the denitrifiers, actually take oxygen from fertilizer nitrates and convert the nitrogen back into a gas that is lost from the soil.

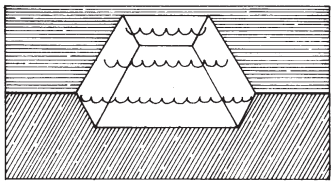
One of the obvious consequences of a wet soil is a cold soil in early spring. More heat is required to warm water than soil. Therefore, if the soil is well drained, it will warm up rapidly in early spring, allowing earlier planting, fewer seedling diseases, and, perhaps, a longer growing season.

Following are some things you can do to encourage your soil to drain better—even in naturally poorly drained soil.

1. **Soil Amendments:** Add organic material like compost to open a soil up, allowing more air space and improving drainage.

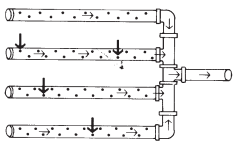


2. **Bedding:** Where erosion is not likely, prepare beds in the fall that can be smoothed off in the early spring for planting. The raised beds also warm up faster in the spring.



3. **Built-Up Soil:** In areas of poorly drained clay soils, build up additional topsoil or a soil mix on the existing soil surface. Avoid digging deeply into the existing soil, because this could create a bathtub effect and actually hold water.

4. **Pipe Drainage:** If the land will allow a drainage outlet, install underground perforated pipe or tile drainage to allow excess water to flow out of the soil. This is similar to installing field lines for a septic tank, only several pipes run parallel across the garden and drain to an outlet. Pipe drainage is more expensive but very effective in certain soils.



Acid Soils Create Gardening Problems

Acid soils (low pH) cause more gardening problems in Alabama than any other soil factor.

Soils become acid naturally in humid climates. Rainfall, over time, leaches out the basic minerals in soils. Fertilizers and organic matter from manure and compost tend to speed up this process. Under very acid conditions (below pH 5.3), some minerals such as aluminum and manganese become very soluble and can be toxic to plants. Plant nutrients such as calcium and magnesium may be deficient in acid soils. Beneficial soil bacteria that fix nitrogen on the roots of legumes such as beans and peas cannot survive in acid soils.

Most Alabama garden soils will require liming every 3 to 5 years to maintain the soil pH between 5.5 to 6.5. A detailed soil test by a reputable laboratory is the only way to determine the precise soil pH and lime requirement.

Soil Acidity and Its Effect

	Soil pH	Effect
Extremely acid	below 4.5	Very few crops survive; aluminum/manganese toxicity.
Very acid	4.5–5.0	Only acid-tolerant plants such as azaleas and blueberries do well.
	5.0–5.5	Some aluminum and manganese toxicity; nutrient deficiencies. Ideal pH for Irish potatoes because scab bacteria doesn't survive well at this pH. Most crop yields slightly reduced.
Moderately acid	5.5–6.0	No visible problems with most crops; yields of crops requiring high calcium and magnesium may be reduced (for example, tomatoes and peppers).
Slightly acid	6.0–7.0	Ideal for most crops; best for soil bacteria/nitrogen fixation. Optimum nutrient availability.
Slightly alkaline	7.0–8.0	Micronutrient deficiencies of iron, zinc, and manganese may occur; too high for acid-loving crops.
Moderately alkaline	8.0+	Severe micronutrient deficiencies. Few garden crops do well.

Excessive Phosphorus In Garden Soils

Soil-test records from Auburn University show that more than 40 percent of Alabama garden soils have very high or excessive levels of phosphorus (P). While excessive phosphorus may not cause any noticeable problems in most gardens, some crops could develop nutritional imbalances.

Phosphorus is naturally low in all Alabama soils. Years of fertilizing with a complete fertilizer such as 13-13-13, animal manures, or composts have built up this nutrient in some soils. Unlike other plant nutrients such as nitrogen or potassium, phosphorus doesn't leach out of the soil. It is tied up by soil minerals and slowly released to growing plants.

A gardener who annually spreads about 20 pounds of 13-13-13 fertilizer per 1,000 square feet will be putting out 110 pounds of phosphate (P_2O_5) fertilizer per acre. High yielding garden crops such as cabbage, peas, potatoes, tomatoes, and corn will take up about 48 pounds per acre of P_2O_5. However, only about 30 pounds of this will be removed from the garden in the vegetables. This leaves an excess of 80 pounds of phosphate to build up in the soil.

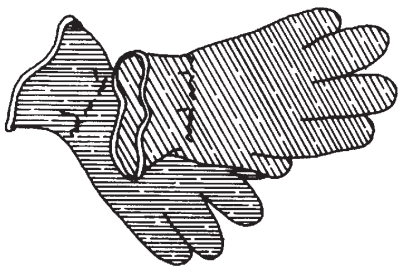
Excessive phosphorus, particularly in combination with a high soil pH (above 6.5), can induce micronutrient deficiencies of zinc and iron. Zinc deficiencies usually show up in early spring as a dwarfing and yellow striping between the veins of younger leaves. It is seen most frequently on corn in Alabama. Iron deficiencies produce a yellowing of younger leaves with veins remaining green.

Nutrient deficiencies such as these are difficult to correct because they are caused by an imbalance—not a simple deficiency. The best solution is to prevent the problem by soil testing and using low phosphorus fertilizers on soils already testing HIGH or VERY HIGH in phosphorus. Following are suggestions for soils that test VERY HIGH and EXCESSIVELY HIGH in phosphorus.

1. Use a mixed fertilizer with no P, such as 15-0-15. These may be difficult to find.

2. Use a combination of 33-0-0 to provide nitrogen and muriate of potash (0-0-60) to provide potassium. (Other sources of N and K may be substituted.)

3. Grow a legume cover crop. Legumes prefer soils high in P, and they fix their own N from atmospheric N. When they die and decompose, they not only increase soil organic matter but also release all this organic N to the soil.



Wood Ashes for Lime and Potash

Most people associate wood ashes with the popular term for potassium fertilizers—potash. Vast areas of forests in the eastern United States were once burned to produce potash for shipment to Europe. This was used as the main source of lye for making soap and as a fertilizer. Wood ashes contain from 1 to 10 percent potash or K_2O (0.8 to 8 percent K). However, the high lime value of ashes is often ignored. Gardeners who use wood ashes can create a high soil pH problem very quickly.

When wood or leaves are burned, some plant nutrients such as nitrogen and sulfur are emitted into the air. The alkali and alkaline earth metals—potassium, calcium, magnesium, and sodium—remain in the ash as carbonates, oxides, and hydroxides. These compounds are all alkaline and may react very rapidly to raise the soil pH. These by-products of burning wood could raise the soil pH above 9.0, creating serious problems for most crops. Agricultural lime, however, reacts slowly in the soil and can never raise the soil pH above 8.3.

How to Use Wood Ashes Around the Home

As A Liming Material. Use only on acid soils (below pH 6.0), which need lime. Have the soil tested and spread dry wood ashes at the same rate as recommended for agricultural lime.

Although wood ashes usually have a lower percentage of lime (calcium carbonate equivalent—see table), the alkaline compounds present are more reactive than agricultural lime. Therefore, pound for pound, the two are about equal in raising soil pH.

As A Source Of Potassium. If the soil is acid (below pH 6.0), wood ashes can be used as a source of potassium. Assuming there is 6 percent K_2O in ashes, 1 ton/A. (50 lb./1000 sq. ft.) will provide 120 lb./A. of K_2O (2.8 lb./1000 sq. ft.). This is adequate for most gardens, lawns, and shrubs. However, nitrogen and phosphate fertilizers may still be needed. Continued use of ashes on the same site or at high rates could raise the soil pH too high—particularly in sandy soils.

1 ton agricultural lime per acre = 50 lb. per 1,000 sq. ft. =
50 lb. wood ashes per 1,000 sq. ft. =
5 lb. wood ashes per 100 sq. ft.
1 gallon dry ashes = approximately 3 lb.

Lime And Nutrient Value Of Some Wood Ash Samples From Homes In Alabama

Source	Lime Value ($CaCO_3$—equivalent)	P_2O_5	K_2O	Ca	Mg
		-percent			
Mixed ashes	71	1.5	1.3	17	0.9
Mixed hardwood ashes	77	1.5	9.1	20	2.4
Oak ashes	89	1.0	3.6	28	0.7
Ashes exposed to rain, (some leaching)	57	2.9	1.7	17	0.8

SOIL TEST RESULTS (Sample Report)

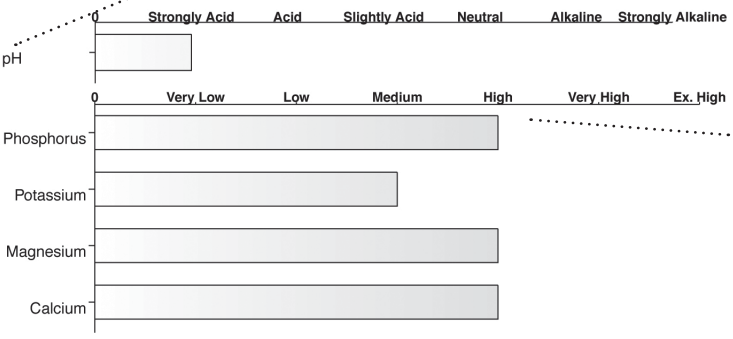
LAB No.	Test Date	Sender's Sample Designation	Crop	Soil Group*	pH**
	03/21/13	Garden	Vegetables	2	5.0

Recommendations for Vegetables:

Ground Agricultural Limestone = 2.0 tons/acre

Fertilizer N-P_2O_5-K_2O = 120-60-120 pounds/acre

pH indicates soil acidity level and helps determine **Limestone Recommendation.**



Rating indicates low, medium, high, very high, or extremely high level of nutrient.

Soil pH = 5.0

Phosphorus*** P = 76 lb/acre

Potassium*** K = 164 lb/acre

Magnesium*** Mg = 70 lb/acre

Calcium*** Ca = 680 lb/acre

See Comments 1,2,3,4,5,6

Method of Analysis = Mehlich-1

Comments below this graph will further explain the pounds of each nutrient to apply for smaller gardens and fertilizer grades that are commonly available. Also see the fertilizer calculator at **www.aces.edu/go/333**.

Garden Fertilizer

Apply fertilizer before or at planting. Two methods of applying fertilizer are broad- cast and in the row. For most gardeners, the broadcast method is more practical.

Broadcast. Spread the recommended rate of fertilizer evenly over the soil surface and then thoroughly mix it into the soil during soil preparation. Heavy- feeding crops need additional fertilizer as a sidedressing after the plants are well established.

In The Row. Apply the recommended rate of fertilizer to the row. Mix it thoroughly with the soil so that it will not damage the seed and tender plants.

Combination. You can apply fertilizer to the garden in a combination of broadcast and row application. Broadcast two-thirds the recommended fertilizer over the entire garden surface and spade or rototill it into the soil. Apply the remaining one-third of the fertilizer in furrows 3 inches to either side of the row and slightly below the seed.

Sidedressing. Fertilizer applied before or at planting time usually will not supply all the nutrients needed during the growing season of heavy- and medium-feeding vegetables. Also, irrigation and rain can result in leaching of the soluble nutrients, especially nitrogen, into deeper areas of the soil and out of the reach of the roots of shallow-rooted vegetables.

Apply additional fertilizer along the row 4 to 6 inches from the base of the plants when the plants are established. This additional fertilizer or sidedressing is usually in the form of additional nitrogen.

Use the online fertilizer calculator at **www.aces.edu/go/333** as a companion to your soil test results.

Measuring Table for Fertilizer

(test recommendations show pounds per area)

Fertilizer	Weight Per Pint
Mixed fertilizer 8-8-8, 13-13-13	1 lb.
Superphosphate	1 lb.
Muriate of potash	1 lb.
Ammonium nitrate	¾ lb.
Limestone	1¼ lb.
Nitrate of soda	1¼ lb.

Sidedress Applications of Nitrogen

Apply 1 pint 33-0-0 per 100 feet of row,
5 teaspoons per 10 feet of row, or 1 teaspoon per plant or hill.

Beans	At 3- to 4-leaf stage.
Beets, carrots	4 to 6 weeks after planting.
Bell peppers, eggplants, tomatoes	After first fruit set.
Broccoli, cabbage, cauliflower, Brussels sprouts	3 weeks after transplanting; apply to broccoli again when heads begin to show.
Corn, summer	When 8 inches high and again when knee high.
Cucumbers, watermelons, winter squash, pumpkins	When vines begin to run.
English peas	When the peas are 4 to 6 inches tall.
Irish potatoes	When sprouts break through soil surface.
Leafy greens (mustard, turnips, chard, collards)	When plants are about ⅓ grown and following first harvest when plants are not pulled.
Lettuce or Chinese cabbage	2 weeks after transplanting, 4 weeks after sowing seed.
Okra	After first pods are harvested.
Onions (green and bulb)	Sets—when tops are 6 inches high; transplants—when established and growing.
Peas, southern	None.
Peanuts	None.
Radishes	None.
Squash, summer	When plants are 8 to 10 inches tall.
Sweet potatoes	None.
Turnips, rutabagas	4 weeks after sowing seed.

Fertilizing the Organic Garden

Organic nutrient sources have two distinct advantages: (1) They provide a slow release nitrogen source to crops that won't burn plants as easily or as severely as some commercial fertilizers, and (2) They improve soil physical conditions by adding organic matter. However, organic nutrient sources also have disadvantages: (1) They are low in nutrients, so large quantities must be applied in order to meet plant needs; (2) They can lead to excess soil phosphorus (P) levels due to the nutrient ratios in many organic-sourced fertilizers (see Excess Phosphorus section). This leads to a potential risk to surface and groundwater contamination if erosion occurs. (3) Weed seed can also be introduced into the garden from some manures.

Phosphorus buildup in soils is almost inevitable with organic-sourced fertilizers unless managed closely. Most manures and composts have a 1:1 ratio of N:P2O5. However, most plants use five times more nitrogen than phosphorus in an annual growth cycle. Excess phosphorus then continues to build up

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FERTILIZING *(continued)*

with annual applications. Look for low P organic fertilizers, and plant legume cover crops whenever possible.

The best organic soil fertilizers, animal manures, are abundant in some areas of the state but are hard to find in others. Where available, poultry and cattle manures are excellent sources of nitrogen and phosphorus and help to improve soil tilth.

Moist broiler litter is equivalent to a 3-3-2 fertilizer. Cow, hog, and horse manures usually contain fewer plant nutrients than broiler manure. Following is an average N-P_2O_5-K_2O content of some dry animal manures. These can be compared to 13-13-13 fertilizers, the most frequently used mineral fertilizer in Alabama.

Manures, particularly poultry manure, must also be incorporated into the soil or some of the nitrogen could be lost. If poultry litter has an ammonia smell, valuable nitrogen is being lost as ammonia gas.

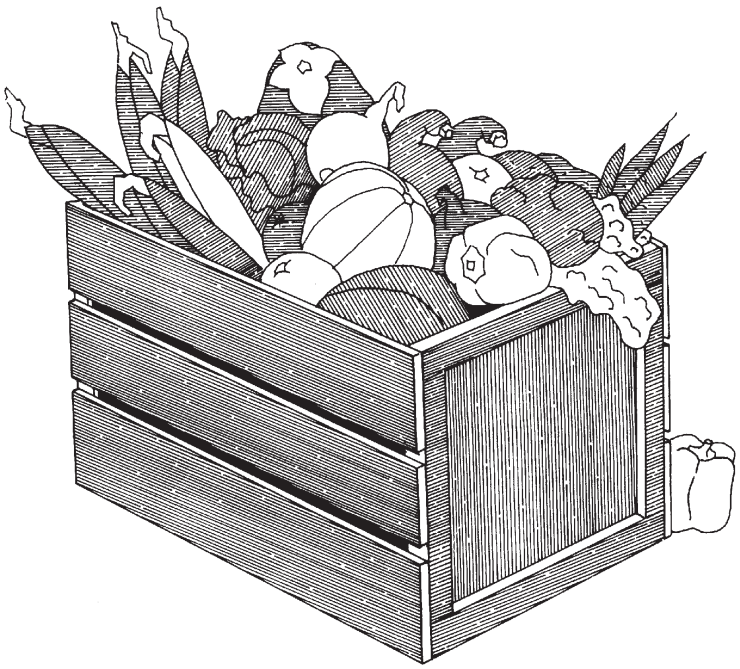
Organic fertilizers must first be mineralized by soil microorganisms to the inorganic form before plant roots can take up the nutrients. Once mineralized, these nutrients are subject to the same soil chemical processes as synthetic fertilizers—leaching, fixation, and absorption by soil clay. Therefore, an organic-sourced fertilizer can lead to plant nutritional imbalances just as a synthetic-sourced fertilizer can. Soil testing is just as important in organic gardens as it is in others, so the gardener can keep up with the nutrients present in the soil and avoid potential problems. Following are some other organic and mineral fertilizers for the home gardener wanting to minimize or avoid synthetic fertilizer sources.

N, P_2O_5, AND K_2O ORGANIC AND MINERAL SOURCES

ORGANIC SOURCE	MINERAL SOURCE
FOR NITROGEN (N)	
Leaf compost (1-3%) Chicken manure (3%) Soybean/cottonseed meal (6%) Blood meal (13%) Fish meal (10%) Animal tankage (9%)	Urea (45%) Ammonium sulfate (21%) Calcium nitrate (15%)
FOR PHOSPHORUS (P_2O_5)	
Chicken manure (1.2%) Bone meal (23%) Fish meal (2.6%)	Superphosphate (20%) Concentrated superphosphate (46%) Ammonium phosphate (46%)
FOR POTASSIUM (K_2O)	
Wood ashes (6%)	Muriate of potash (60%) Potassium sulfate (50%)

ORGANIC FERTILIZERS LOW IN P

Chilean nitrate	16-0-0	Fish meal	10-3-0
Feather meal	12-0-0	Cottonseed meal	6-1-1
Blood meal	12-0-0	Fish emulsion	5-1-1



Some Common Organic Fertilizers

Name of Fertilizer	Analysis in Percent (Fresh-Weight Basis) N	P_2O_5	K_2O
Blood (dried)	10	3	0
Remarks: A very rapidly available organic fertilizer.			
Fish scraps (dried meal)	9	3	0
Remarks: Do not confuse with fish emulsives that generally are quite low in fertilizer content. Contains 6% calcium.			
Guano, bat	6	9	3
Remarks: Partially decomposed bat manure from caves.			
Guano, bird	13	11	3
Remarks: Partially decomposed bird manure from islands off coast.			
Manure			
Cattle	1.5	1.5	1.2
Chicken	3.1	3.0	2.0
Horse	1.7	0.7	1.8
Sheep	2.0	1.0	1.0
Swine	2.0	1.4	1.8
Mushroom manure (spent)	1	1	1
Meal			
Bone, raw	4	22	0
Remarks: Main value is nitrogen since most of the phosphorus is not soluble.			
Bone, steamed	2	20	0
Remarks: As a result of steaming under pressure, some nitrogen is lost, but more phosphorus is soluble for use by plants. Contains 20% calcium.			
Cocoa shell	2.5	1	3
Remarks: Primarily a conditioner for complete fertilizers.			
Cotton seed meal	6	2.5	2
Remarks: Generally very acid. Useful in alkaline soils.			
Hoof and horn	14	0	0
Remarks: The steam-treated and ground material is a quickly available source of nitrogen.			
Oyster shells	0.2	0.3	0
Remarks: Because of their alkalinity, these are best used for raising pH rather than as a fertilizer.			
Peat (reed or sedge)	2	0.5	0.7
Remarks: Best used as a soil conditioner rather than as a fertilizer. Breaks down too rapidly.			
Rice hulls (ground)	0.5	0.2	0.5
Tankage			
Cocoa	4	1.5	2
Garbage	3	3	1
Process (leather, hair, wool, felt, feathers, etc.)	8	2	0
Wood ashes	0	2	6
Remarks: Quite alkaline. Do not use on high pH soils. Contains 20% calcium.			

Weed Control in Home Gardens

Good weed control may determine to a large extent the success of your home garden. Weeds compete with the crop for soil moisture, sunlight, space, and plant nutrients. They compound disease problems and serve as hiding places for insects. Also, weeds may prevent dusts and sprays from thoroughly covering your garden plants, resulting in poor pest control.

Weeds can usually be divided into two groups—grasses and broadleaf weeds. Grasses are multistemmed plants with fibrous root systems. Once grasses become established, they are difficult to control without injuring the vegetable crops. Grasses are very competitive in gardens and make harvesting difficult. Many broadleaf weeds grow upright and have taproot systems that make them easier to pull than grasses; therefore, the vegetables receive less injury.

Preventive Control. New weed seed may be brought into a garden on plows and mowers that have been used in weedy areas. Poultry litter, compost, and manures sometimes contain troublesome weed seed. Weedy hay used for mulch may bring a number of new weed problems. Occasionally, home-saved vegetable seed may also include some weed seed.

Most of the weed problems in the garden are homegrown problems. That is, they come from weed seed produced in the garden in years past. Season-long weed control to prevent weeds from reseeding should be a basic part of any weed control program. Controlling weeds by preventing them from making a seed crop may be a long-term process, but in the end it is the only sure way to control this problem.

Mechanical Control. Historically, gardeners have used hoeing, plowing, hand-pulling, and mulching to control weeds. Mechanical control methods used on a regular and continuing basis provide good weed control for serious gardeners. This usually means frequent, shallow cultivations with a plow and hoe to destroy weeds in the two- to four-leaf

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Weed Control

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stage. A few minutes spent destroying the flush of weeds that usually emerge after every rain is much more effective than hours or days spent trying to destroy established weeds.

Many gardeners have too large a garden to control weeds in the time available for that task. A few well-managed rows may produce greater yields of higher quality vegetables than a larger area tended in a slipshod manner.

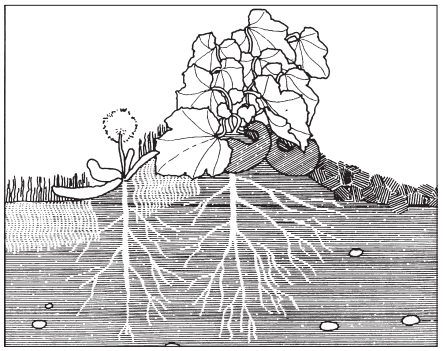
Mechanical weed control gives immediate results. There are no problems of uniform application, drift, and residues as with chemicals. Weeds may be controlled mechanically under a wide range of soil moisture conditions, and very little skill is required. Also, mechanical methods may be used as often as needed. Mechanical weed control is the most practical approach to weed control in small gardens. The greatest weakness of mechanical methods is the lack of residual control.

MULCHING. Mulch can be a valuable asset in controlling weeds in perennial and long-season crops such as asparagus, strawberries, tomatoes, and peppers. Six to eight inches of pine straw, leaves, or well-decomposed sawdust will help suppress most weed problems. Mulch helps keep the soil surface cool and cuts down the evaporation of soil moisture. Many gardeners clean-cultivate early and mulch heavily to control weeds in long season crops such as tomatoes, peppers, and okra, because late cultivation could damage these large, spreading plants.

Mulch gradually decomposes during the season, and sometimes this may cause plants to develop a slightly yellow cast. A light application of about 1 pint of 33-0-0 per 100 feet of row will usually correct this problem. Additional mulch may be added as needed when the older material settles or decomposes. At the end of the season, the mulch may be turned under or incorporated to add organic matter to the soil.

CHEMICAL CONTROL. Most annual grasses are easily controlled with garden-approved herbicides. However, herbicides only control small-seeded, annual broadleaf weeds that grow from the upper 1 to 2 inches of soil; they usually do not give acceptable control of large-seeded broadleaf weeds.

You can use a herbicide for grass control and then rely on hoeing, plowing,



hand-pulling, and mulching to control weeds that escape the chemical treatment. It is not advisable to use a herbicide unless you are also going to control broadleaf weeds. Removing just the grasses would only remove some of the competition and would allow the broadleaf weeds to flourish. In a very short time, these weeds would replace the grasses and create an almost hopeless situation.

SEEDBED PREPARATION. Chemical weed control will be improved by preparing the seedbed well. Destroy old crop residue and turn it under early enough for it to decompose. Spread manure and apply lime and fertilizer as recommended by soil test. A uniform, well-prepared seedbed will result in a quick crop stand and improved weed control.

TRANSPLANTS. Chemicals used where transplants are to be set should be timed as directed on the label and applied to a weed-free seedbed. Weeds germinating before transplants become established should be removed before applying herbicides.

METHODS OF APPLICATION. Read the label instructions before attempting to apply any chemicals. Cyclone seeders or spinner-type applicators are best for applying granular herbicides. Granules sold in shaker cans should be applied in two light applications going in different directions to get uniform application. Add liquid formulations to about one-half the required water before adding it to the sprayer tank. Make wettable powder herbicide formulations in a slurry in a bucket and strain the slurry as you add it to the sprayer tank.

RESIDUE PROBLEMS. Some herbicides may leave residues that could injure certain susceptible second crops. Avoid this by either selecting a tolerant second crop or by using a herbicide that does not leave a harmful residue.

EQUIPMENT. Estimating or pacing off areas to be treated with a herbicide may lead to serious errors in application rates. You need a 50- to 100-foot tape to get accurate measurements. Use flags or stake markers to identify the area measured for treatment.

The bucket or sack-type cyclone seeders and spinner-type lawn fertilizer spreaders are very satisfactory for applying granular herbicides. Many models have a calibration sheet that can be used to calibrate the spreader for applying herbicide granules.

Pressure sprayers in 1-, 2-, and 3-gallon sizes are usually used to apply liquid and wettable powder herbicides. The 2-gallon size is the most popular except for growers with very large gardens. These are available in stainless steel and galvanized metal tanks. The galvanized models cost less but have a relatively short life before rusting out. The more expensive stainless steel models should last indefinitely.

APPLICATION SUGGESTIONS. Use a tape measure to determine the number of square feet to be sprayed. Consult the label for the rate of application. Accurate measurements, correct weights, and uniform application are essential for good weed control without injury to the vegetables.

Apply liquid concentrate and wettable powder herbicides in about 2 gallons of water per 1,000 square feet with a compressed air sprayer. Application errors are not a serious problem when sprayed at this dilution rate; however, they often become much more serious as the chemical concentration is increased. For this reason it is not advisable to reduce the water rate. If the water rate must be adjusted, it would be better to increase it and spray the area twice going in different directions.

Liquid or wettable powders must be agitated to prevent settling to the bottom. Periodically shake the sprayer tank while spraying.

Do not use a sprayer that has previously been used for applying 2,4-D or similar type herbicide. Immediately after use, take the nozzle apart and clean the strainer, back flush the boom and hose, and thoroughly clean the tank before storing the sprayer.

SUMMARY. Because of the high variability among vegetable crops, weed problems, cultural practices, and soil types, no step-by-step standard weed control system has been devised. Using a combination of mechanical weed control and mulching herbicide treatment—capitalizing on the best features of each of these practices—is the best approach to weed control in the home garden.

PRECAUTIONS. Always follow the manufacturer's directions printed on the label for handling and use of herbicides. Proper storage and safe disposal of empty containers are important.

Vegetable Varieties for the Home Garden

Asparagus—Jersey Giant, Jersey Knight, UC 157 F_1, Grande, Jersey King, Jersey Supreme, Purple Passion

Broccoli—Gypsy, Green Magic, Arcadia, Premium Crop
Cabbage—Bravo, Cheers, Cardinal (red), Platinum Dynasty, Red Dynasty (red)
Cauliflower—Early Snowball, Snow Crown, White Magic
Brussels Sprouts—Long Island Improved, Jade
Kohlrabi—Grand Duke, Early Purple Vienna

Snap Beans, Bush—Bronco, Magnum, Bush Blue Lake 274, Renegade, Roma II (flat type)
Snap beans, Pole—Stringless Blue Lake, White Seeded Kentucky Wonder, Kentucky Blue
Lima, Bush—Bridgeton (ss), Dixie ButterPea (ss), Foodhook 242 (ls), Early Thorogreen (ss), Dixie Speckled ButterPea (ls)
Lima, Pole—Carolina Sieva, King of the Garden, Willow Leaf
ss=small-seeded ls=large-seeded

Beets—Detroit Dark Red, Red Ace, Ruby Queen
Carrots—Apache, Danvers 126, Purple Haze, Sugar Snax 54
Radishes—Cherry Belle, Early Scarlet Globe, Champion, Sparkler, White Icicle, April Cross*, Everest*
*storage

Collards—Blue Max, Flash, Georgia Southern, Top Bunch, Vates (also a kale variety with same name), Heavi-Crop
Kale—Siberian, Vates (also a collard variety with the same name), Squire, Winterbor

Cucumbers—Calypso*, Dasher II, Daytona, General Lee, Poinsett 76, Colt*, Thunder
Cantaloupes/Melons—Ambrosia, Athena, Odyssey, Honey Max**, Santa Fe**
Watermelons—AU Producer, Crimson Sweet Jubilee II, Lemon Krush, Regency, Royal Sweet, Sangria, Summer Gold, Starbrite
Summer Squash—Destiny III (cn), Dixie (cn), Medallion (cn), Supersett (cn), Conqueror III (sn), Goldbar (sn), Lynx (z), Spineless Beauty (z), Tigress (z), Patty Green Tint (s), Peter Pan (s), Scallopini (s)
Winter Squash—Celebration (acorn), Table Queen (acorn), Tay Belle PM (acorn), Butternut Supreme, Waltham Butternut, Early Butternut, Golden Hubbard, Vegetable Spaghetti, Green Striped Cushaw
Pumpkins—Munchkin, Field Trip, Spookie, Cotton Candy (white skinned), Lumina (white skinned), Appalachian, Aspen, Magic Wand, Merlin, Big Max, Gold Rush, Atlantic Giant, Prize Winner
*Pickle-type
**Honey Dew
cn=yellow crook-neck sn=yellow straight-neck
z=zucchini s=scalloped typed
****=pumpkins listed in increasing fruit size from smallest to largest*

Eggplant—Classic, Epic, Santana, Casper (white), GhostBuster (white), Ichiban (small diameter type), Rosalita (small diameter type)
Pepper—Capistrano (bell), Camelot X3R (bell), King Arthur (bell), Orobell (yellow bell), Cubanelle (frying type), Bananna Supreme (frying type), Habeñero (hot), Mitla (hot), Long Slim Cayenne (hot)
Tomatoes
- Large fruited—Amelia VR (TSWV), Bella Rosa (TSWV, heat-tolerant), Carolina Gold (yellow-fruited), Celebrity, Crista (TSWV), Finishline (TSWV), Mountain Fresh Plus (early blight tolerance), Primo Red (TSWV), Red Defender (TSWV)
- Cherry types—Cherry Grande, Mountain Belle, Sun Gold
- Grape types—Cupid, Elfin, Golden Sunrise, Jolly Elf, St Nick, Smarty
- Roma/Plum types—Muriel (TSWV), Picus (TSWV), Plum Crimson, Plum Regal (TSWV)
- Heirlooms—Brandywine, Black Krim, Red Rose, Persimmon, Russian Rose, Hawaiian Pineapple, Copia, Rutgers

Head Lettuce—Ithaca, Great Lakes
Leaf & Butterhead Lettuce—New Red Fire (red leaf), Red Sails (red leaf), Salad Bowl (green leaf), Sierra (green leaf), Slobolt* (green leaf), Tango (green leaf), Buttercrunch (butterhead), Ermosa (butterhead), Esmeralda (butterhead),
Cos (or Romaine)**—Green Towers, Parris Island Cos

Mustard—Florida Broadleaf, Green Way*, Savannah, Southern Giant
Spinach—Bloomsdale Long Standing (savoy), Early Hybrid #7 (smooth leaf), Chesapeake Hybrid (smooth leaf), Melody, Tyee
Turnips—Alamo, All Top, Just Right, Purple Top White Globe**, Seven Top***, Shogoin**, Top Star, Southern Green
**Tolerant of conditions that induce bolting*
***Good for producing turnip roots as well as for greens*
****Good for late fall/early winter production*

Okra—Annie Oakley II, Cajun Delight, Clemson Spineless, 80, Emerald, Lee, North and South

Onions (short day types) for Bulbs—Granex 33, Savannah Sweet, Texas Grano 1015Y
Green Onions or Bunching Onions—Beltsville Bunching*, Evergreen Bunching*, Ishikura Long, Parade
**bulbing type*

Garden or English Peas
The best are short, running varieties, and these need a short trellis. The suggested varieties include Dual, Knight, and Green Arrow. The Sugar Snap peas are high climbers needing a 4-foot trellis for support. The suggested varieties include Oregon Sugar Pod II, Sugar Bon, and Sugar Snap.
Southernpeas
- *Blackeyes—Bettergro Blackeye, California Blackeye #5, Magnolia Blackeye, Queen Anne*
- *Pinkeyes—Coronet, Pinkeye Purple Hull BVR, Quick Pick Pinkeye*
- *Cream (cream with browneye)—Texas Cream 12, White Acre BVR*
- *Crowders—Hercules, Mississippi Purple, Mississippi Silver, Zipper Cream*

Irish Potatoes—Atlantic, Dark Red Norland, La Rouge, Red LaSoda, Yukon Gold
Sweetpotatoes—Beauregard, Hernandez, Jewel, O'Henry, Muraski (purple skin, whiteflesh)

Sweet Corn
White
- Early Season—Silver Princess (se), Sweet Ice (se)
- Mid Season—Ice Queen (sh2), Summer Sweet 8101R (sh2), Xtra-Tender Brand 372A (sh2), Snow White (sh2)
- Late Season—Silver King (se), WSS 0987)sh2) Tahoe (sh2)

Bi-Color
- Early Season—Temptation II (sh2), Lancelot (se)
- Mid Season—BigTime (sh2), Summer Sweet 8102R (sh2), Sweet Chorus (se), Sweet Rhythm (se)

Yellow
- Early Season—Mirai 130 Y (sh2), Bodacious (se)
- Mid Season—Prime Plus (sh2), Summer Sweet 7210 (sh2), Passion II (sh2), Merit (su)

Growing Tomatoes

Tomatoes are the most popular crop for Alabama vegetable gardens, but getting the most out of the tomatoes you plant requires more planning and careful work than any other crop.

Site selection is a key consideration in growing tomatoes. Plant tomatoes only in a sunny location, one that gets at least 6 hours of full sun a day during the growing season. Tomato production is reduced according to the amount of time the tomato plant is shaded.

Tomatoes produce well on a wide range of soils, but best yields are usually made on deep fertile loams and sandy loam soils. Almost any soil can be modified through the use of organic matter, lime, and fertilizer used according to soil test results. Avoid planting tomatoes on extremely sandy soils or heavy clay soils that are difficult to manage when dry.

Select an adapted variety and reject any plants with symptoms of disease. There are dozens of good tomato varieties, but it's best to pick a recommended variety for your region. Be sure the variety you select has resistance to Verticillium wilt, Fusarium wilt, and Root-knot nematodes. This is indicated by the letters, ``V,F&N'' accompanying the variety name.

A 4- to 6-inch deep mulch of old hay, straw, sawdust, or shavings will reduce weed problems and conserve soil moisture by reducing evaporation from the soil surface. It will also help cut down on fruit lost to blossom-end rot and cracking, and it can reduce Early blight, a common foliar disease of tomato.

Tomato plants should be pruned and supported. Prune by removing suckers that develop from the ground level up to but not including the sucker that develops below the first flower cluster. Pruning can increase fruit size as well as encourage earliness. Foliar diseases are also easier to control when suckers are pruned.

It is important to support tomato plants to keep them from toppling over and to prevent the fruit from resting on the ground. When tomato plants fall over, they spread out, exposing the fruit to the sun hardsoil surface. This results in a large portion of fruit being lost to sunscald or soil rot.

The three most popular methods of supporting tomato plants are caging, trellising, and staking; each method has its advantages and disadvantages. Caging is usually easy once cages have been constructed. But cages are often too short for tall-growing tomatoes, they tip over easily, and they must be stored at the end of the season.

Trellising tomatoes up to an overhead wire with heavy binder twine is an effective means of support. However, trellising requires a little more effort and is more time consuming. Don't attempt trellising unless you plan to do season-long pruning. With trellised tomatoes, cleanup at season's end is much easier.

Staking is the most widely used method of supporting tomatoes. Stakes should be 4 to 6 feet long and strong enough to support a heavy vine with 30 to 35 mature tomatoes. It should be durable enough to last all season.

If tomatoes are to be pruned to a single stem, delay setting the stakes until plants begin to bloom. Drive the stake in the ground about 6 inches from the base of the plant and on the opposite side of the stem from the first flower cluster. This prevents crowding fruit between the stem and the stake. Plants pruned to a single stem develop all flower clusters on the same side of the stem.

Tomatoes are susceptible to a wide range of foliar diseases. Protect plants with preventive fungicides. Begin spraying when plants are 8 to 10 inches tall and continue spraying every 7 to 10 days or according to the manufacturer's label directions. Keep in mind that heat and light destroy these chemicals, and the plants are constantly adding new growth. So, frequent applications of fungicides are needed.

Insecticides may be added to fungicide sprays when needed to control specific insect problems. Be sure to identify the insect to determine which insecticide to use. If you are unsure, contact your local Extension office for a recommendation. All insecticides should be used according to the directions on the label. Best control can be expected if materials are applied when insects are small.

If drought-stressed plants are to be irrigated or if rains occur after a prolonged dry period, any mature fruit may crack. Therefore, mature green, pink, and ripe fruit should be picked from drought-stressed plants. Spread harvested fruit on tables to ripen (away from sunlight).

Blossom-end rot can develop if plants are allowed to become severely drought stressed. If a source of water is available, irrigate plants every 7 to 10 days during dry weather to reduce fruit loss.

Weed control should begin with the first weeds that emerge after frost and continue until the first frost in the fall. Small weeds are easy to destroy, and weed control is improved by cultivation during dry weather. Mulch will reduce the need for late season weed control.

With the exception of nutgrass, garden weeds can be controlled with frequent shallow cultivation with a plow or hoe. Failure to achieve good weed control is usually because of lack of determination on the part of the gardener rather than the aggressive nature of the weeds. Most weeds die quickly if their roots are exposed to the sun.

Bitter Cukes

Nearly every vegetable grown in the home garden has its quirks and problems. A problem that is sometimes associated with cucumbers and, on very rare occasions squash, is bitter flavored fruit. It can be downright frustrating to have a seemingly perfect cucumber, only to bite into it and find it tastes so bitter that it can't be eaten!

Cucurbitacin. The bitterness that is sometimes noticed in cucumbers is because of a substance known as cucurbitacin. Cucurbitacin is a toxin that is thought to play a role in cucumber disease resistance. The higher the concentration of this substance, the more intense the bitterness. A very high concentration of cucurbitacin can cause a memorable stomachache. Occurrence of cucurbitacin is a genetically controlled phenomenon, but it is usually triggered by some environmental stress on the plant.

The Culprit: Environmental Problems. There are several environmental factors that can cause stress on the plant. Wide temperature fluctuations for several days and nights, or possibly just very high daytime temperatures for a period of time, can contribute to bitterness. But, temperatures may be less important than some other factors. Low soil moisture (or uneven watering—very wet, then very dry), low fertility, and low pH are all possible contributors to stress that can lead to bitterness. Also, stress imposed by insect or disease infestations can lead to bitter fruit.

Bitter-Free. Selection of burpless or bitter-free slicer-type cucumber varieties such as Sweet Success, Sweet Slice, Marketmore, or Burpless can help reduce chances of coming up with bitter fruit. But, perhaps a more important way to reduce the chance of bitterness is to mulch around

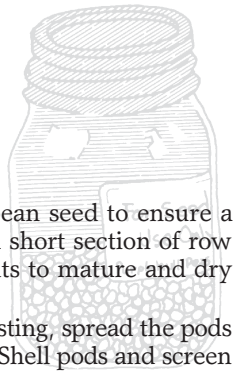
(continued)

BITTER CUKES *(continued)*
cucumber plants, fertilize and lime properly, provide 1 inch of water a week (depending on soil type), and control insects and diseases. If corrective measures are carried out after bitterness is noticed, the fruit that comes along later will sometimes have the normal cucumber flavor.

SQUASH IS DIFFERENT. Bitterness in squash is a little different from that in cucumber. In squash the bitter flavor is because of genetic factors that are not influenced by environmental stress. Squash bitterness is much rarer than cucumber bitterness and has only been reported in zucchini and yellow straightneck varieties. Bitter squash can cause extreme stomach cramps and diarrhea, so if the first bite is bitter, don't eat the rest.

Once bitter fruit is found, the subsequent fruit from that squash plant will be bitter. There is much that is unclear about this phenomenon in squash, and it is an area in which plant breeders and other researchers are interested.

HOME-GROWN SEED

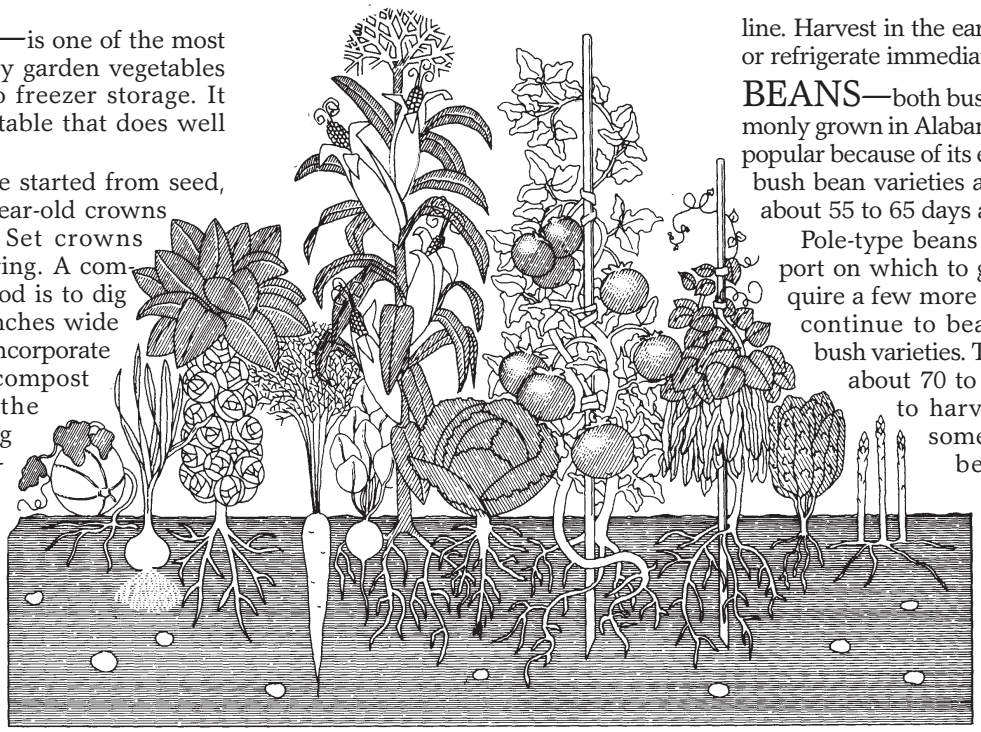


Some Alabama gardeners like to save their own pea and bean seed to ensure a supply of that variety for the next year. It is best to set aside a short section of row specifically for growing seed and leave the pods on these plants to mature and dry before harvesting for seed.

Select only well-filled, disease-free pods for seed. After harvesting, spread the pods in a thin layer in a well-ventilated place for 2 to 3 weeks to dry. Shell pods and screen and clean seed before treating for weevils.

Weevils may be controlled in a small quantity of seed by heating them in a conventional oven at 120 to 130 degrees F for 20 to 30 minutes to destroy the insects. Temperatures in this range are fatal to most insects and do not impair the germination of the seed, but temperatures that exceed 130 degrees F may lower the germination of some seed. Place seed in a paper bag on the rack in the oven and set a shallow pan of water on the bottom to prevent excessive drying of the seed. Allow the seed to cool; then store in an air-tight container.

Weevils may also be controlled by placing the seed in a glass jar and adding 1 level teaspoon of 5 percent malathion dust per pint of seed. Place the seed in the jar and add the malathion dust on top. Make sure the lid of the jar is screwed on tight. Then shake the jar to distribute the dust throughout the seed. Always label the jar FOR SEED USE ONLY and store in a cool dry place. Never store seed that has been treated with any kind of pesticide near seed being saved for food or feed.



VEGETABLE INFORMATION

ASPARAGUS—is one of the most valuable of the early garden vegetables and is adaptable to freezer storage. It is a perennial vegetable that does well in Alabama.

Asparagus can be started from seed, but starting from year-old crowns is recommended. Set crowns out in the early spring. A common planting method is to dig a trench 10 to 12 inches wide and about as deep. Incorporate rotted manure or compost in the bottom of the trench before setting the crowns 12 inches apart in rows 36 to 48 inches apart. Place the crowns on top of a small amount of loose soil in the bottom of the trench. Spread the roots out and cover the crowns with 2 to 3 inches of soil. As the plants begin to grow, pull the soil in around crowns and cover them until the trench is filled. For a family of four, a 50-foot row should be sufficient.

Do not harvest asparagus shoots or spears until the second year after the crowns are planted. Only harvest for about two weeks. Stop harvesting when spear diameter is less than that of a pencil. This is necessary for the fleshy root system to develop and to store food reserves for growth the following year. Plants harvested too early after planting become weak and spindly. After the third year of growth, harvesting usually can continue for 6 to 8 weeks. Stop harvesting during the late spring and allow the ferns to grow. After the first hard winter freeze, cut the plants back to ground level to allow new growth and development of tender spears.

Harvest the spears daily when they are 5 to 7 inches tall. Snap off above the soil line. Harvest in the early morning and use or refrigerate immediately.

BEANS—both bush and pole are commonly grown in Alabama. The bush type is popular because of its early maturity. Most bush bean varieties are ready to harvest about 55 to 65 days after planting.

Pole-type beans require some support on which to grow. They also require a few more days to mature but continue to bear longer than the bush varieties. They usually require about 70 to 80 days from seed to harvest. Green beans, sometimes called snap beans, reach their best stage of edible maturity when the seed within the pod is about one-third mature.

Lima beans, sometimes called butter beans, can be grown either as pole or bush-type beans. There are several types of pole and bush lima beans; generally pole beans take longer for pods to mature than the bush type. They also produce during slightly higher temperatures than green beans.

Beans will not withstand frost. Therefore, make the first planting after the danger of the last killing frost in the early spring. Beans planted in cold soils are more susceptible to seedling diseases.

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Make successive plantings of bush snap beans at 2- to 3-week intervals. Cease plantings when the beans are forced to mature under high temperatures, which cause poor quality.

Plant bush beans about 1 inch deep in rows 30 to 36 inches apart. Space the plants 2 to 3 inches apart in the row. Lima beans require a little more space, about 3 to 6 inches. Beans will not produce well when they are crowded. Spacing may be achieved by planting seed and then thinning as plants grow.

Bean roots grow close to the soil surface, so limit cultivation to the top 1 inch of the soil to prevent damage. Beans suffer from drought easily so provide adequate water throughout the growing season, especially at bloom and during pod setting.

BROCCOLI—is one of the best fall vegetables. Broccoli has a central green head that, when removed, forms smaller lateral heads.

Broccoli is best grown from transplants that can be purchased locally or grown at home. Broccoli does best in a moderate to highly fertile, well-drained soil. Space plants about 12 to 18 inches apart in rows 36 inches apart. Maintain a fairly rapid growth rate throughout the season with adequate water and fertilizer. Approximately 3 to 4 weeks after transplanting, apply a sidedress application of a small amount of calcium nitrate to stimulate growth.

Broccoli heads are a mass of flower buds. Harvest the heads before flowers open and show yellow. When ready to harvest, the central head usually measures 3 to 6 inches across. Lateral heads that develop after harvesting the central head are smaller. When harvesting, cut 3 to 4 inches of the stem and accompanying leaves with the head. Use or freeze broccoli soon after harvesting.

CABBAGE—grows best during cool temperatures. It does not withstand excessive heat common to Alabama summers and, therefore, should be planted as an early spring or fall crop.

Cabbage can be either seeded directly or transplanted but does best when transplanted. From seeding to transplanting is 3 to 4 weeks.

Plant spacing affects head size with close spacing producing smaller heads. Recommended spacing is about 12 inches apart in rows 36 inches apart.

Harvest cabbage when it reaches adequate size, depending upon variety and growing conditions. Firmness is preferred to soft heads, especially for storage. Mature, firm heads can be left on the plant in the garden for about 2 weeks in early summer. Cabbage can be stored successfully in the refrigerator for a month or two.

CANTALOUPES—are a warm-season crop, requiring a relatively long growing season of 80 to 100 days.

Cantaloupes can be grown from transplants but do best when direct-seeded in the garden. Place rows at least 5 feet apart with hills spaced 2 to 3 feet apart in the rows. Plant seed ½ to 1 inch deep after the danger of frost is well past. A sidedress application of fertilizer when the plants start to run greatly increases yields. Avoid over-watering as the fruits mature, because low sugar content and poor flavor result.

Harvest cantaloupes at one-half slip stage. Exercise care when walking through the plants to avoid injuring the foliage. Plants can be trained during the early developmental stages to grow in rows to enable easier harvesting.

CARROTS—are planted 4 to 6 weeks before the anticipated last spring freeze. Broadcast seeds in a wide bed or plant in rows. Plant seeds thickly and very shallow, generally not more than ¼ inch deep. Since carrot seeds sprout slowly, it may be necessary to water two or three times to get them up. Poor stands often are owing to poorly prepared seedbeds or crusty soil, which inhibits emergence.

After the carrots are up and growing, thin to 1- or 2-inch spacing. Water them regularly, especially after they reach the size of a pencil. Moisture fluctuations cause carrots to crack, be of poor quality, and sometimes rot. Keep cultivation to a minimum and use only to control weeds. Depending on variety, it generally takes 2½ to 3 months for most carrots to mature. Carrots are best when harvested small, not more than an inch in diameter at the crown.

CAULIFLOWER—probably requires more exact growing conditions than any other home garden vegetable. Cauliflower requires cool but frost-free temperatures and a humid climate to develop center heads or curds. Cold temperatures can cause stunting and premature heading. Varieties differ in plant size, curd size, and in days to maturity, ranging from 70 to 100 days.

Cauliflower does best as a fall crop in most areas of Alabama. Space plants about 18 inches apart in rows 30 to 36 inches apart.

Exposure to sunlight discolors the head and produces off flavors. To prevent this, gather the long leaves over the head and tie them together. This must be done as soon as the curd begins to develop.

The center head or curd matures about 2 weeks after tying. Mature curds are about 6 inches in diameter. Heads turn from clear white at the peak of maturity to yellowish brown when overly mature. Cool immediately after harvest and keep refrigerated. If cauliflower must be stored for several weeks before using, leave a portion of the stalk and leaves to protect the curd.

COLLARDS—are closely related to cabbage, cauliflower, broccoli, and Brussels sprouts. They are especially valuable nutritionally since they supply important amounts of vitamin A, ascorbic acid, and iron. Pound for pound, greens such as collards contain much more vitamin A than snap beans, sweet corn, or green peppers.

Collards can be sown directly in the garden or transplanted beginning in February through March and again beginning in September. Plant collards on rows 36 inches apart with plants spaced 12 inches apart in the row. When harvesting, remove one or more leaves from each plant but never harvest more than one-third of the leaves from a single plant. A small amount of sidedressed fertilizer after the first harvest increases productivity.

These greens usually are ready for harvest about 2 months after planting, but thinnings can be used much earlier.

CORN, SWEET—should mature before high day and night temperatures occur. Therefore, early planting is a necessity. Plant on or within a few days of the average date of the last killing frost.

Plant corn in rows 30 to 36 inches apart with seed 12 to 15 inches apart. Cover seed to a depth of about 1 inch. Plant sweet corn in a block rather than in long rows to ensure good pollination and ear fill.

Harvest in the early morning when the air temperature is still relatively cool. If harvesting during high temperatures, remove the field heat by plunging the ears into cold water or placing them in the refrigerator immediately. This helps maintain the fresh-from-the- garden quality of the ears. Normally, sweet corn is

ready to harvest about 3 weeks from the day the first silk appears on the ear.

CUCUMBERS—differ in the fruit types and uses; both the slicer or fresh salad type and the pickle type are available for home garden use. Cucumbers are multiple harvest plants, and, when properly grown, only a few plants are needed to provide an adequate supply for the average family.

Plant 4 to 5 seeds per foot in rows spaced about 36 inches apart. Untrellised rows may need to be spaced as much as 4 feet apart. When plants are 4 to 5 inches high and before they begin to run, thin the plants to 24 inches apart in a row.

For the flowers to develop into fruit, pollen must be carried by insects from the male flowers to the female flowers, the ones with the small "pickle" behind the bloom. Poor set is common during rainy weather when pollinating insects are inactive. Spray insecticides in the late afternoon to avoid harming insect populations necessary for pollination.

Fruits may be used from the time they are 1½ to 2 inches long until they begin to turn yellow. This period is approximately 10 to 12 days for any one fruit. It is important to remove cucumbers before they turn yellow so that plants continue producing. If the fruits are picked early, plants bear a large number of cucumbers; if harvest is delayed until fruits are large, yields are lower.

EGGPLANT—is very sensitive to cold soils and is not at all frost tolerant. It does best when grown from transplants, which should be set in the garden 2 weeks after the last frost-free date. Space the plants 24 to 36 inches apart in rows 36 inches apart.

Eggplants do best in a well-drained, moderately fertile soil. After the first fruit set occurs, apply a small amount of fertilizer around each plant and water it in. Additional fertilizer may be applied after the first harvest.

Fruits are edible from the time they are about one-third grown until they are ripe, and they maintain edibility after achieving full color. Mature fruits are glossy in color and slightly firm. Fruit that is left on the vine too long or matures under extremely high temperatures or low moisture conditions often becomes bitter. Be sure to harvest the fruit as it matures so new ones can develop.

Do not bruise or damage the fruit in any way.

LETTUCE—is an important cool-season vegetable and one of the easiest to grow. Lettuce withstands light frost but can be damaged by freezing temperatures.

Leaf lettuce is by far the easiest to grow and, therefore, the most highly recommended for home gardens. Space lettuce 12 inches apart in rows 30 inches apart. For early planting, start seed in a protected area and transplant later.

Lettuce can be planted on the shady side of taller growing crops such as sweet corn, tomatoes, and pole beans. Lettuce works well when planted between rows of later maturing crops like tomatoes, peppers, and eggplant. Border planting along the edges of the garden or in a flower bed also is possible. Make successive plantings every 3 to 4 weeks so that lettuce is available for awhile. High summer temperatures can cause lettuce to send up a seedstalk and develop a bitter flavor. Recently, new heat-tolerant varieties have been developed that resist bolting and development of off flavors. Try a heat-tolerant variety during summer and early fall.

OKRA—is a warm-season crop that grows well in most areas of Alabama. Delay seeding until 3 to 4 weeks after the last frost. Varieties differ in plant size, pod type and color, and number of spines. Dwarf varieties without spines and with smooth green pods are best for home gardens.

For good germination, soak the seeds for about 6 hours in warm water before planting. Plant 3 to 4 seeds per foot ¾ inch deep in rows 36 inches apart. After plants are 3 to 4 inches tall, thin to final stand of about 12 inches between plants.

Cut off the pods when they are 2 to 4 inches long. Once harvesting starts, continue to harvest every 2 to 3 days to maintain productivity. An occasional light fertilizer application maintains quality and yields. You can store okra in plastic bags in the refrigerator for several weeks or blanch and freeze them for later use.

ONIONS—give a good return for the space occupied and should be included in every garden in Alabama. For green onions, plant seed as soon as the soil can be worked in the early spring. Two to four rows of onions on each bed maximize yields. Plant seed about ½ to ¾ inch deep. Most green onion varieties are ready for harvesting within 80 to 90 days from seeding.

If you are interested in growing large bulb onions, set out transplants in early spring, usually 4 to 8 weeks before the anticipated last killing freeze in your area. Transplants should be no larger than a lead pencil and should be spaced about 2 inches apart in the row. Two rows of onions per bed are satisfactory. When onion plants have about five leaves, sidedress with about ½ cup of 15-0-15 fertilizer for each 10 feet of row. Scatter the fertilizer evenly between rows and water it in. Since onions have a limited root system, a constant supply of moisture should be available. This is especially true once onions start to bulb and enlarge.

Bulb onions are ready for harvest when stems weaken and fall over. Pull them from the garden and place in a protected area to dry for 1 to 2 days. After drying, remove the tops and roots and store in a relatively dry, cool area.

POTATOES, IRISH—have their yield influenced by season, variety, soil type, moisture availability, and amount of nutrients available to the plant. Highest yields are obtained in years with cool temperatures and adequate moisture throughout the season.

Potatoes require a large amount of fertilizer for good growth and production. Apply an additional ½ to 1 pound of complete fertilizer (such as 10-10-10) for each 100 feet of garden row before planting potatoes.

Plant potatoes 3 to 4 weeks before the last killing frost. Use only certified seed stock. Seed potatoes should be firm and unsprouted. Cut the seed potatoes into pieces weighing about 2 ounces. Each seed piece must have at least one good bud or eye. Plant the pieces about 3 inches deep, 10 to 12 inches apart, in rows about 36 inches apart.

After the plants emerge and begin to grow, mound the plants. This simply means pulling soil around the plants several times during their early growth until the seed pieces are about 6 inches deep.

Potatoes are ready to harvest when they are mature and the skin is set. Depending on the season, this is usually 90 to 120 days after planting.

Avoid bruising potatoes when digging. Store potatoes for a week at 65 to 70 degrees F in the dark to help heal bruises.

RADISHES—are one of the easiest vegetables to grow. They do best when grown during cool weather with plenty of moisture. Under these conditions they grow rapidly and produce crisp, tender roots. Many varieties are available that mature about 25 days from seeding. Make several small plantings at 1- to 2-week intervals to ensure a continuous harvest. Plant radishes about ½ inch deep. After emergence, thin the plants to approximately 1 inch apart. If radishes are allowed to become overly mature, especially during high temperatures, a hot, bitter flavor often occurs.

SOUTHERNPEAS—should be planted after all danger of frost is past. Peas prefer a light, well-drained soil that is not too fertile. Peas grown in an over-fertilized soil produce a great deal of foliage and often have very poor pod set. In the area where southern peas are to be grown, reduce the amount of preplant fertilizer to one-half the recommended rate.

Sow seed 2 inches apart in rows 36 inches apart. Thin to about 6 inches between plants. It is important to maintain relatively uniform soil moisture during bloom and seed maturity.

SPINACH—is a quick maturing, cool-season crop of high nutritional value. Some varieties mature in only 40 days when planted during favorable weather conditions. When planted too late in the spring, spinach often goes to seed. This can be prevented by planting in mid-February or early September.

Plant spinach in rows about 24 to 30 inches apart. Plant sufficient seed to get a good stand and then thin plants to 2 to 4 inches apart in the rows. After plants emerge, maintain good moisture and a rapid growth rate until maturity. A light fertilizer application when plants are approximately one-third grown produces high yields of good quality spinach.

Harvest spinach by pulling the whole plant or by removing the outer leaves as the plant grows. Successive plantings at 2- to 3-week intervals ensures continued harvest of good quality spinach. After harvesting, use or place in the refrigerator immediately.

SQUASH—are usually classified as summer or winter squash. Fruits of summer squash are eaten in immature stages before the skin hardens. Winter squash are allowed to mature on the vine until the skin becomes relatively tough. Under favorable conditions, most summer squash varieties produce their first usable fruits 6 to 8 weeks from planting and continue to bear for several weeks. In general, winter squash require longer to mature.

All types of squash are highly susceptible to frost and should be seeded in the garden after danger of frost is over.

Squash are normally planted in hills 15 to 36 inches apart in rows 36 to 60 inches apart. Plant seed about 1 inch deep. Squash usually do not do well until soil and air temperatures are above 60 degrees F.

When the first blooms appear, apply a small amount of fertilizer as a sidedress application and water it in. After harvest begins, an occasional light fertilizer application maintains vigorous growth and high productivity.

SWEETPOTATOES—need a long growing season. They do best in coarse-textured soils that are well drained and relatively low in nitrogen. Excessive nitrogen or heavy applications of animal manures can cause long, spindly roots and low quality. Heavy soils cause misshapen roots.

Sweetpotatoes are planted from transplants (slips) available from local nurseries or garden centers.

Plant slips 2 to 3 inches deep in ridges or rows 42 to 48 inches apart. Slips should be 12 inches apart in the row. Plant in April through June. A second planting of sweetpotatoes can be made with vine cuttings from the first planting. An 18-inch cutting can be directly stuck and rooted in moist ground.

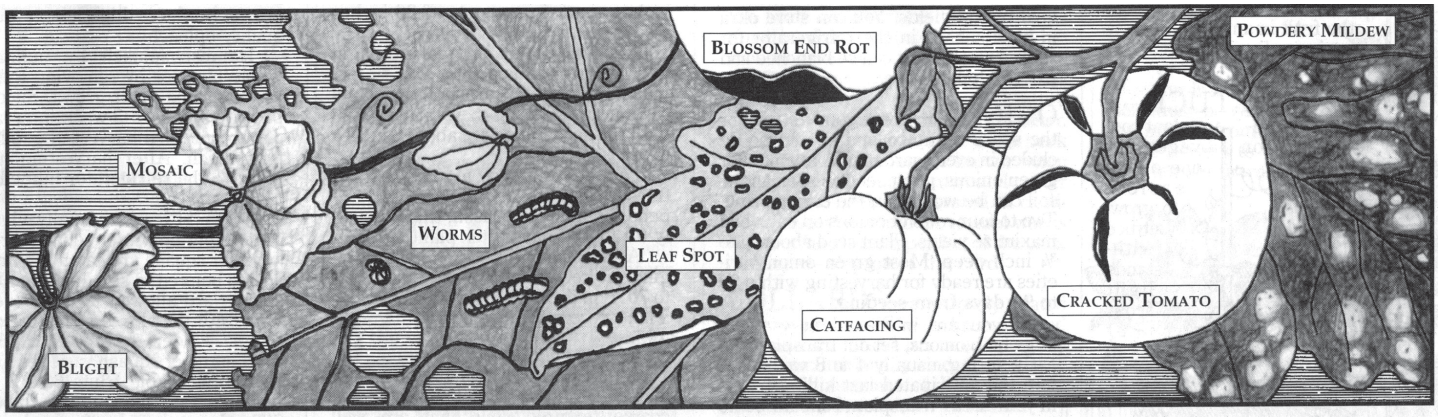
Sweetpotatoes are ready to harvest when the greatest number of 8- to 10-ounce sweetpotatoes are found under each plant. Harvest before the first killing frost occurs to prevent injury to the sweetpotatoes. Clip the vines before the frost occurs. The crop can then be harvested easily with less damage to the sweetpotatoes. To reduce rotting in storage, be sure sweetpotatoes are clean, dry, and injury free.

Cure sweetpotatoes before storing. Curing usually requires 7 to 10 days if the temperature is maintained at 80 to 85 degrees F with 70 to 90 percent humidity. After curing, keep the sweetpotatoes as near 65 degrees F as possible with the humidity at 85 percent.

WATERMELONS—should be direct-seeded after danger of frost. Plant 3 to 4 seeds per hill about 1 inch deep. Space the hills 5 feet apart in rows about 6 feet apart.

Depending on variety, watermelons will be ready for harvesting 75 to 90 days from seeding.

Watermelons are ready to harvest when the ground spot or place where the melon touches the ground turns a yellowish color. The fruit also takes on a dull appearance compared to their appearance before maturity. Another good indication of maturity is a dead tendril or curl near the point where the fruit is attached to the vine. If you thump your watermelon to determine ripeness, remember that ripe fruit has a dull rather than a metallic sound.



Garden Problem Guide

Symptoms	Possible Causes	Possible Cures
Dying young plants	Fertilizer burn	Mix fertilizer thoroughly with soil.
	Soilborne diseases (damping-off)	Use treated seed.
Stunted plants (pale to yellow) Herbicide injury	Low soil fertility	Soil test for fertilizer recommendations.
	Poor soil drainage	Add organic matter.
	Shallow or compacted soil	Work soil deeper.
	Insects or diseases	Identify and use control.
	Nematodes	Use approved chemicals.
Stunted plants	Low temperature	Plant at recommended time.
	Low pH	Add lime.
Purplish color	Lack of phosphorus	Add phosphorus fertilizer.
Holes in leaves	Insects	Identify and use control measures.
	Hail	Be thankful it was not worse.
Spots, molds	Disease	Identify, spray, or dust; use recommended rate and time.
	Chemical burn	Use recommended chemicals at recommended rate and time.
	Fertilizer burn	Keep fertilizer off plants.
Darkened areas on leaves and stems	Chemical burn	Use recommended chemicals at recommended rate and time.
	Fertilizer burn	Keep fertilizer off plants.
Wilting plants	Dry soil	Irrigate, if possible.
	Excess soil moisture	Avoid overwatering.
	Disease	Use resistant varieties, if possible.
Weak, spindly plants	Too much shade	Move garden to sunny area.
	Plants too thick	Seed at recommended rate.
	Too much nitrogen	Avoid excess fertilization.
Failure to set fruit	Improper temperatures	Follow recommended planting time.
	Too much nitrogen	Avoid excess fertilization.
	Insects	Identify and use control measures.
Dry brown to black rot on blossom end of tomato	Low soil calcium	Add gypsum.
	Extremely dry soil	Irrigate and mulch.
Misshapen tomatoes (catfacing)	Cool weather during blooming	Plant at recommended time.
Abnormal leaves and growth	2,4-D weed killer	Do not use sprayer previously used to apply 2,4-D.
	Virus disease	Remove infected plants to prevent spreading. Control insects that transmit the virus.
Cracked tomatoes	Drought followed by heavy watering or rain	Keep plants mulched and watered.

Control Diseases for Top-Quality Tomatoes

Tomatoes are by far the favorite and most widely grown vegetable in home gardens. Nothing can be more satisfying than picking a juicy red tomato from your own garden on a hot summer day for a salad or a sandwich. To have a plentiful supply of top-quality tomatoes throughout the summer, you must not only fertilize tomatoes correctly but control diseases as well.

Unfortunately, few gardeners realize the need to control diseases. As a result, they harvest progressively poorer quality fruit over a much shorter period than they could have from healthy plants. Actually, most garden varieties of tomatoes can produce until frost. This means that gardeners in South and Central Alabama could enjoy fresh tomatoes well into November and even December in many years.

Tomato diseases can be successfully controlled with a little extra effort and planning before setting out plants. The first step in planning a successful disease control program is to select a location for your tomatoes that has good drainage and is in a full-sun location. It is best to select a site that has not had tomatoes, peppers, or potatoes grown on it within the past 2 years. This practice will reduce the risk of soilborne diseases such as Fusarium wilt, seedling diseases, or nematodes. When purchasing tomato plants, examine them carefully for leafspots or signs of injury on the stems. Buy only those plants that have a healthy green appearance and are free of blemishes. Be sure to select varieties that are resistant to some of the more common diseases such as Fusarium wilt, Root-knot nematode, Verticillium wilt, and Tomato Spotted Wilt virus. This information should be listed on the seed pack or label. For example, varieties that have the letters V, F, & N near their name are resistant to Verticillium, Fusarium, and Root-knot nematodes.

When handling tomato plants, make certain you have washed your hands thoroughly, particularly if you smoke or chew tobacco. Tobacco Mosaic virus, a destructive disease on tomatoes, can be transmitted to tomatoes by tobacco contaminated hands.

Once the plants are in the ground, you should begin a regular disease control spray program within 7 to 10 days. Proper equipment, spray coverage, and timing are critical to control foliar diseases. You should have a 2- or 3-gallon stainless steel or noncorrosive sprayer that can produce a fine spray. All parts of the tomato plant must be sprayed. Spray fungicide at 7- to 10- day intervals throughout the growing season.

There are fungicides available that do an excellent job of controlling early blight, the predominant foliar diseases in Alabama. Mancozeb, chlorothalonil, and liquid copper fungicides are frequently used and control a variety of foliar fungal diseases. Occasionally, bacterial leaf spot becomes a problem. When this happens, copper must be added to the spray mixture since fungicides will not control bacterial diseases. Later in the season when insects such as tomato fruitworm become a problem, insecticides can be added to the fungicide spray mixture.

When using any pesticides, read the labels carefully and follow their directions. Some fungicides and insecticides have restrictions concerning the time of their last application and harvest. Be sure to heed these restrictions; always follow proper procedures.

Beautiful homegrown tomatoes require a lot of work and a good disease control program, but the extra quality and season-long enjoyment of such a fruit is well worth the extra effort.

Nematodes Could Be the Reason Garden Is Unproductive

Some gardeners are surprised to find that their gardens are not producing as many vegetables as they had expected. There could be several reasons for a garden's poor performance: low soil pH, poorly drained or compacted soils, inadequate sunlight, or insufficient nutrients. But if these factors are not the problem, nematodes could be the culprit responsible for poor performance. Many gardeners fail to recognize nematode damage because nematodes feed on the plant's roots, restricting their growth and impairing their ability to take up needed minerals and moisture from the soil. Above ground, plants damaged by nematodes are often stunted, exhibit mineral deficiencies, and, in extreme cases, may wilt and die.

What Are Nematodes?

Nematodes are extremely small, worm-like animals that can only be seen with the aid of magnification. Actually, there are many species of nematodes. Some feed on decaying organic matter in the soil (visible with human eye); others parasitize animals including humans; a few species feed on plant roots (only visible with microscope). The latter group is called plant parasitic nematodes. They are armed with tiny, hollow spears by which they feed, sucking the plant's juices. Of the many plant parasitic nematode species, root-knot nematode is the most common and widespread in the state and is so named because of the characteristic swellings it produces on the plant's roots as a result of its feeding. Root-knot nematode attacks a variety of vegetables and even weeds. Because of its ability to feed on so many vegetables, few—with the possible exception of sweet corn—can be grown safely in areas where high populations of this nematode are found.

Other plant parasitic nematode species, which include stunt nematode, sting nematode, reniform nematode, and lesion nematode, do not cause typical root-knot swellings but nevertheless cause serious injury. To identify these nematodes, a nematode analysis of the soil may be necessary to determine if those kinds of nematodes are a problem.

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Nematodes

(CONTINUED)

The best time to sample for nematodes is from September to late October. Taking soil samples for a nematode analysis any other time of the year, especially in the winter, is not recommended.

Take soil samples within the row from around the root zone where nematodes are concentrated, place them in a plastic bag to prevent the soil from drying, and keep them in a cool place. Soil samples can be analyzed at the Plant Diagnostic Laboratory for a fee ($10). Private laboratories also analyze soil for nematodes.

If you find that you have a nematode problem in your garden, there are several options available for controlling them. Fallowing (keeping the infested area free of all vegetation, including weeds) for 2 years or more is an effective and inexpensive method if you have plenty of land. When selecting your vegetable seed or transplants, purchase a variety that has nematode resistance. Rotate your vegetables within your garden from year to year to reduce not only nematode injury but also diseases. Try not to plant the same vegetable or related vegetables on the same land more often than every third year.

No chemical controls for nematodes are available at this time for the home gardener. Soil solarization may be your only alternative in cases where nematode populations are extremely high. Soil solarization is a method that employs a transparent polyethylene cover to trap heat. This procedure has been shown, when used correctly, to be effective in reducing (not eliminating) plant-parasitic nematodes, as well as soilborne diseases and weeds. Transparent polyethylene tarps are placed over the infested soil for 4 to 6 weeks beginning in June. The sun then heats the soil to temperatures that kill many soil pests and brings favorable physical and chemical changes in the soil itself.

Vegetable Garden Insects

Vegetables grown in the southern United States are vulnerable to attack by a variety of insect pests. Our warm temperatures and long growing seasons are not only ideal for vegetable crops but also for insects—beneficial and pest. Insects have highly developed senses for locating host plants, so some form of insect control is often necessary to protect vegetable plants from severe feeding damage. The best approach is a combination of differing control tactics: (1) cultural controls, (2) mechanical or physical controls, and (3) chemical controls (biorational or conventional). Insects are less able to adapt to and overcome this multitiered management style. *This multiple strategy approach is called integrated pest management—IPM.* Prevention rather than delay of controls until peak insect activity is the best approach with any combination.

Control tactics, used singly or in combination, termed as cultural methods include planting under optimal and timely conditions, reducing water stress, timely harvesting, using trap crops, rotating crops, early planting, optimal seedbed preparation, removing crop residues, planting resistant varieties, etc. Implementing cultural practices can prevent or minimize insect migration and establishment in the garden, thus requiring fewer (or possibly no) insecticide applications. ***Crop rotation*** helps prevent some insects, particularly those that live in the soil (wireworms and white grubs). This practice also helps prevent some disease problems (Fusarium wilt fungi and many others). Annually moving the garden may not be possible due to space restrictions, but you can change the location of individual vegetable crops within the garden each year. ***Early planting*** of crops prevents damage by many of the late-season insects (late-season crops are the hardest hit due to higher insect populations feeding together). ***Optimal seedbed preparation*** promotes vigorous, new plant growth allowing plants to better tolerate minor insect damage. This is especially important in the spring garden. Wait for a good weather forecast before planting seed or transplants. ***Removal of plant debris***, or sanitation, at the end of the season reduces insects' overwintering sites. Many pests mature during the winter in the stems and roots of host plants left in the garden. ***Trap cropping*** is an emerging technology in several southern states. Research in Alabama shows promise in reducing leaffooted bugs on tomato and yellow-margined leaf beetle on cabbage. The basic approach is to plant perimeter trap crops and treat them instead of the vegetable with approved insecticides. Trap crops can extend the harvesting period, reduce pesticide use, and grow better-quality produce. Trap crops like Peredovik sunflower and silage sorghum (NK300) not only deter leaffooted bugs and stink bugs but also increase biodiversity providing habitat for natural enemies such as syrphid flies and lady beetles. ***Resistant varieties*** are not completely immune to damage but are less attractive to the insect pest and may be able to tolerate more damage than a nonresistant, susceptible variety. Check seed catalogs and transplant labels for information on resistant varieties that grow well in your area.

Mechanical controls are those that physically remove the pest or prevent pests from interacting with the crop. In small gardens, ***handpicking*** insect pests can be an effective and practical control. This requires daily attention and will not be effective for most flying insects and night feeders. ***Exclusion devices***, such as netting and row covers (fabric or plastic materials), are useful mechanical controls that prevent, reduce, or delay pest invasion with a physical barrier. Net houses of 50-mesh fabric can offer complete blockage of tomato hornworm and fruitworm moths.

Chemical controls are pesticides and include any substance that causes harm to a pest (mammal, insect, bacteria, fungi, or other). Pesticides are chemicals (plant-based, biorational, or synthesized in a lab) that deter or kill the organism damaging a crop or desired plant. Use pesticides when cultural and mechanical tactics fail to fully manage the pest problem. This minimizes your exposure to chemicals and protects the beneficial organisms associated with your garden environment.

Many biorational insecticides have low environmental persistence and are slow acting. They can be used as soon as the pest is detected but may also necessitate additional applications as new pest populations appear. **Always read the pesticide label** (biorational or synthetic pesticide) for instructions and other information before using it. The label tells you everything you need to know from the harvest waiting period (time needed between the last spray and harvesting), handling and application instructions,

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VEGETABLE GARDEN INSECTS *(CONTINUED)*

beneficials that might be harmed by it, and the acceptable crops that the chemical can safely treat.

Correct use of pesticides means applying only when necessary and using the label-directed procedures to apply the recommended amount at the right time. Excessive use of insecticides does not result in better insect control, can harm beneficial insects (vulnerable to many synthetic and natural insecticides), and actually causes outbreaks of secondary pests and pesticide resistance in a pest population.

Choosing the best insecticide for the situation solely depends on correct identification of the insect pest and of the plant you intend to treat. Gardeners can subscribe to the *Alabama IPM Communicator* newsletter to stay informed of pest outbreaks, insect identification, scouting strategies, and management tactics. The newsletter archive is available at www.aces.edu/go/273.

A full list of approved home garden insecticides is available in Extension publication ANR-0500-B, *Alabama Pest Management Handbook, Volume 2*, Home Garden Vegetables. **Note**: insecticides must be applied when pest numbers are low and their size is small. Applying insecticides in an outbreak (high population) is not cost effective for the garden or for managing the pest.

Bt *(Bacillus thuringiensis)*. This beneficial bacterial species kills the larval stage of moths and butterflies. It offers the best control on most caterpillars if used on new, young larvae. Do not use in or near a butterfly garden. Do not apply Bt on top of leaves when weather is excessively hot and dry as the bacteria are damaged in these conditions. Be sure to direct sprays to the underside of leaves, on stems, and on all shady corners of a plant where caterpillars may hide.

Horticultural Soaps and Oils. Oil and soap sprays control a variety of insects by physically disrupting their body functions. They are effective on a wide variety of small pests, such as aphids, scale, mites, and whiteflies. Oils can be used both on dormant or actively growing plants. Do not apply soaps and oils during peak summer to avoid leaf burn. Repeated treatments may be necessary to suppress heavy pest populations.

Sevin (carbaryl). Carbaryl is available as dust (5 to 10 percent) and spray. It is also available in granular formulation for early season soil pest control. It controls a wide variety of insects including mites, thrips, flea beetles, stink bugs, earworms, fruitworms, cucumber beetles, and many others. Avoid applications when pollinators are actively foraging.

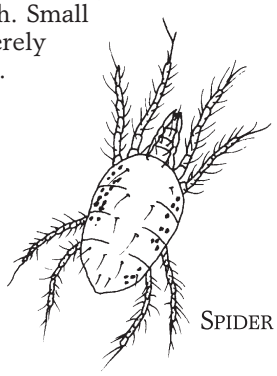
Synthetic pyrethroids (such as Cyfluthrin, Permethrin, and Bifenthrin). These control a wide variety of insect pests with rapid knockdown. Read the label for cautions concerning pollinators and aquatic life.

Imidacloprid. This is the first systemic insecticide approved for use on home garden vegetable crops. The product is taken up by the roots and then translocated to other plant parts. It provides excellent control of early season insect pests such as aphids and flea beetles. Do not use the product in the late season.

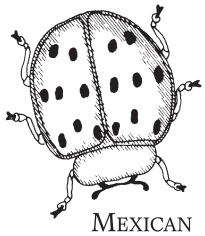
Spinosad. This fast-acting insecticide is derived from a bacterium, *Saccharopolyspora spinosa*. The organic-approved formulation called Entrust is available for small farmers. Spinosad has excellent activity against caterpillars, Colorado potato beetle, thrips, flea beetles, and many other small insects. Read the label; it is highly toxic to pollinators.

APHIDS (plant lice)—Aphids are small (inch or less), soft-bodied insects with two projections on the rear end that look like tail pipes. Aphids may be yellow, green, pink, brown, or black. Adults and their young suck plant juices and cause distortion and stunting of tender plant growth. Small plants may be severely weakened or killed. Because of their feeding method, aphids carry several plant virus diseases that may be more destructive than the aphids themselves. Aphid damage to vegetables begins early in the spring and can continue throughout the growing season. Find colonies of aphids near growing points and under leaves. They feed on a variety of vegetables including cole crops, cucurbits, beans, peas, potatoes, and tomatoes. Observe small plants closely in the spring. In some cases, small aphid populations can be washed off plants with a strong stream of water spray. Insecticidal soaps and oils are also effective with multiple spray treatments (see table on page 25). Early season application of transplants with imidacloprid (soil drench) can also provide plant protection for up to 3 weeks.

CORN EARWORMS (also known as tomato fruitworms)—Corn earworms feed on a wide variety of vegetables including beans, peas, sweet corn, okra, tomatoes, cabbage, eggplant, and peppers. Minor leaf feeding may be seen, but most damage is done to the corn ear. Earworms feed in the whorls of young sweet corn, resulting in large ragged holes. They later feed on the

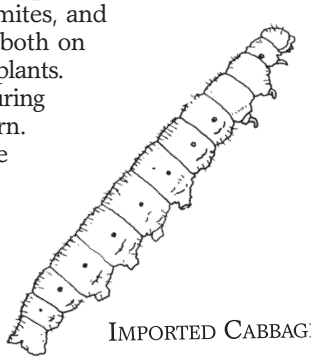


SPIDER MITE

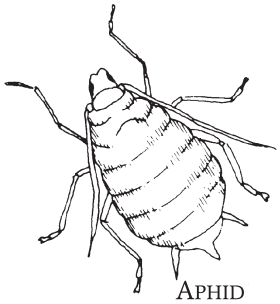


MEXICAN BEAN BEETLE

COLORADO POTATO BEETLE



IMPORTED CABBAGEWORM



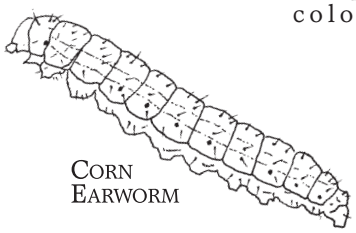
APHID

silks and kernels from the tip of the ears downward. Larval feeding on the silks may interfere with pollination.

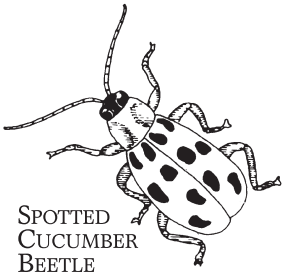
Fully grown corn earworm larvae are up to 1¾ inches long and vary in color from light green to pink to brown to nearly black. The body is marked with alternating light and dark stripes running lengthwise. The head is yellow and the legs are dark or nearly black. The skin of the larva is coarse with short black hairs. Larvae mature into tan-colored, night-flying moths. Damage from this insect becomes more severe as the season progresses. Thus, early planting and use of early maturing varieties prevents some damage. Varieties with tighter husk leaves may also minimize pest entry. Corn earworms seem to prefer "supersweet" varieties. Use recommended insecticides as soon as larvae are found. Corn earworms feed primarily on the ear tips, often leaving most of the ear undamaged. Insecticides may not be needed if the tips are discarded before eating. However, spraying every 2 to 3 days beginning at silking achieves totally clean ears.

MEXICAN BEAN BEETLES–

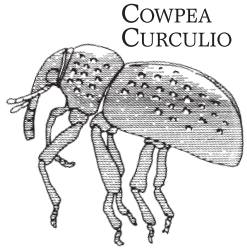
Adult and larval stages feed on the leaves of snapbeans, pole beans, lima beans, and, to a lesser extent, cowpeas. The adults are copper colored with 16 black spots on their backs. Larvae are yellow and covered with spines. Eggs and pupae (the inactive stage before the adult stage) are also commonly seen on the foliage along with the feeding stages. Distinctive orange-yellow eggs are laid in clusters of 40 to 60 on the undersides of leaves. Pupae are yellow, smooth, and resemble the head of a cobra. There are usually three to four generations of Mexican bean beetles per year in Alabama. Hot, dry summers as well as extremely cold winters tend to reduce populations. Feeding begins on the lower surfaces of leaves, but high populations can be seen feeding on all above-ground portions of the plant. They leave leaf veins undamaged, giving the leaf a skeletonized appearance. Mexican bean beetles are easily killed with most garden insecticides, but if left unchecked, they can completely defoliate bean plants. Sprays should be directed to the undersides of leaves.



CORN EARWORM



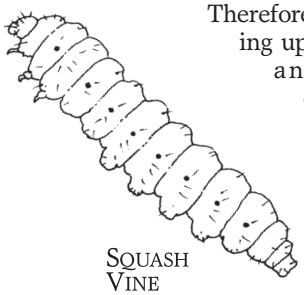
SPOTTED CUCUMBER BEETLE



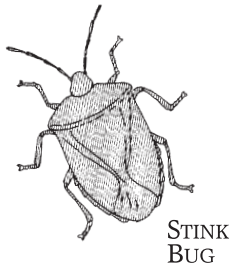
COWPEA CURCULIO

SPOTTED CUCUMBER BEETLES—

The larvae feed on the roots of corn as well as cucurbits (cucumbers, melons, squash, and pumpkins). The adults are yellowish-green with 12 black spots on their backs. Larvae are small, white, and soft bodied. The beetles eat holes in the leaves and flowers. Young plants may be killed. Larval feeding on roots results in wilted, unproductive plants. Cucumber beetles also transmit bacterial wilt, a very destructive disease of cucurbits. This insect survives the winter as an adult in crop residue and weeds. Therefore, cleaning up weeds and garden debris in the fall will reduce the next year's population. Cucumber beetles can be controlled by spraying a recommended insecticide when beetles are seen.



SQUASH VINE BORER



STINK BUG

SQUASH VINE BORERS–

The larvae damage squash plants by boring into the vines and crown. Infested plants may wilt and die. Sawdust-like insect excrement coming from holes in the vines is evidence of active larvae inside the stem. Adults are clear-winged moths that lay their eggs on vines early in the season (moths may look like red wasps hovering at the base of vine). Pheromone-based sticky traps are excellent tools for removing the early season moths or for scouting. Once hatched larvae enter a plant, insecticides cannot control them. Chemical control depends on the young larva being exposed to an insecticide during its short period after egg hatching and before entering the plant. Other control measures that may prevent problems are early planting and destruction of old crop residues. Squash vine borer populations are higher later in the summer so early planting can avoid much of the damage. Mechanical deworming of vine is another way of removing the caterpillars (watch http://www.youtube.com/watch?v=2if4HlGirt8 for details). Squash vine borers survive the winter in dead squash vines so destroying these overwintering sites is critical to reducing next year's population.

COLORADO POTATO BEETLES—

As adult and larval forms, Colorado potato beetles are very serious pests of Irish potatoes. They can also damage tomatoes, eggplants, and peppers. The adult beetle is about 3/8 inch long, yellow with 10 black stripes, and hard shelled. Larvae are humpbacked, soft bodied, and brick red with rows of black spots along each side. Groups of a dozen or more orange, barrel-shaped eggs are often visible on the undersides of leaves. Each female lays approximately 500 eggs. In Alabama, there are two or three generations per year. Both adult and larvae are voracious foliage feeders. Untreated infestations can result in complete defoliation. Handpicking will help protect plants if done often. Otherwise, apply Sevin or Thiodan when an infestation is first detected. Repeat applications may be necessary as eggs hatch. Spinosad is effective against the larvae (see table on page 25).

GARDEN INSECTS
(CONTINUED)

IMPORTED CABBAGEWORMS–

These feed on all forms of cruciferous plants but prefer cabbage and cauliflower. They frequently damage turnips, kale, collards, radishes, and mustard. When cabbage plants are small, cabbageworms feed primarily on the undersides of the developing leaves. When the heads develop, cabbageworms feed on the outer leaves and bore into the centers. Larvae also cause damage by contaminating the heads with their greenish-brown excrement.

The adult form, a familiar insect to all growers of crucifers, is a white butterfly with a wingspan of about 2 inches. These butterflies are commonly seen around gardens. When fully grown, the larva is about 1 inch long and velvety green with a faint yellow stripe along the middle of the back and a row of yellow spots along each side. The larva crawls slowly over the plant and does not show any of the looping action characteristic of the cabbage looper, another important pest of cabbage. The pupae, the immobile stage prior to the adult butterfly, are also commonly found on cabbage plants.

Pupae are about 4/5 inch, sharply angled, and green with black spots. There are usually four to six generations of imported cabbageworms per year in Alabama. Naturally occurring parasites and insect diseases play an important role in controlling imported cabbageworms. However, insecticides are often necessary to prevent excessive damage. Bt's are very effective in controlling this and other worm pests of cole crops. They are nontoxic to humans and have no preharvest waiting periods. Other effective insecticides are available.

COWPEA CURCULIO–

Predominately a pest of cowpeas, it may occasionally damage snap beans and lima beans. Adult female weevils lay eggs in young pods; damage is done by the larvae feeding within the developing seeds. Damaged pods have black wartlike marks where the eggs were laid and have poorly developed peas.

Eggs hatch 3 days after being laid and the young larvae eat their way into the developing peas. After about a week of feeding, the larvae drop out of the pod to the soil to pupate; new adults emerge about 1 month after egg laying. Two generations per year occur in Alabama. Late-planted peas (late July) will sometimes escape damage.

Crop rotation and sanitation techniques are helpful, but insecticides are usually necessary to prevent excessive damage. Start spraying when the first pods are ½ inch long. Repeat three or four more applications every 3 to 5 days. Endosulfan is effective against curculio and is less harmful to beneficial insects than some other insecticides.

SPIDER MITES—

These pests are tiny (barely visible) and damage many vegetable crops by sucking juices from the undersides of leaves. Mites are a close relative of insects. When populations are high, mites can cover plants with fine webs resembling spider webs. Spider mite problems are more prevalent during hot, dry weather. Damage is first evident as small white or pale yellow spots on the leaves. Severe infestations may result in the loss of leaves.

Spider mites are readily moved within gardens by the activities of humans. Therefore, avoid moving infested plants to uninfested areas.

Spider mites are very difficult to control in a home garden. Light infestations can be controlled by washing off plants with a strong stream of water. Insecticidal soaps often work as well or better than other insecticides and have no preharvest waiting periods. Soaps will need regular reapplications.

Bifenthrin, insecticidal oils, and sulfur powder may provide mite control at low pest pressure. Results are inadequate for high populations during hot, dry weather. Do not mow lawns near the vegetable garden during drought (prolonged dry weather) to avoid spider mite transfer to leaves. Overuse of some miticides can actually lead to increased spider mite infestations due to death of more sensitive predatory mite species. Spot treatment of plants and timely removal of infested plants may reduce spread of spider mites to healthy plants.

STINK BUGS—

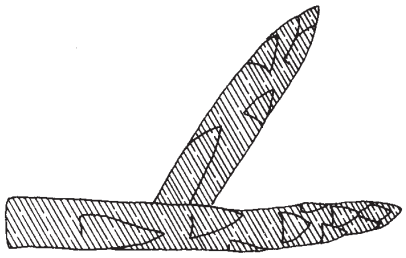
About an inch long as adults and green or brown in color, these pests earn their names by giving off a foul odor when handled. The young resemble the adults in shape but are somewhat more rounded. Young stink bugs are often seen clustered around the group of eggs from which they hatched. Stink bug eggs are barrel shaped, laid in clusters, and usually on leaf undersides. Adults and young suck plant juices. Leaffooted bug adults are larger than other stink bugs and have leaflike expansions on the hind legs. Both of these have strong host preferences and migrate long distances searching their preferred host plants. In recent years, the leaffooted bug has become the dominant sucking-pest insect on high-value vegetables, especially in the late season when multiple generations are feeding. Be aware of the predatory stink bugs similar in appearance to plant-feeding pests; careful observation and correct identification protect these and avoid misapplication of insecticides.

Characteristic damage varies with the type of vegetable. On lima beans, little evidence of feeding damage may be visible on the exterior of the pods, but inside, damaged beans are shriveled and spotted with slick brown stains. Stink bug feeding on young okra pods and corn ears causes these vegetables to be distorted or become crescent shaped. Damaged tomato fruits show whitish yellow spots and pithy tissue inside.

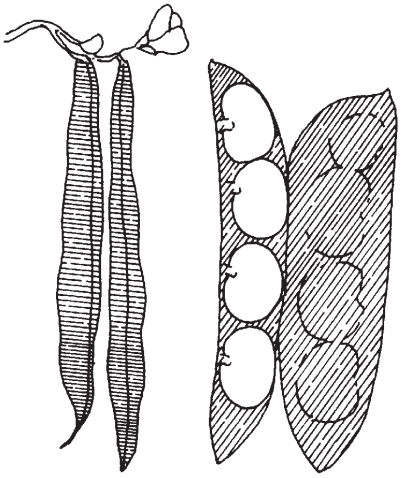
Perimeter trap crops of forage sorghum and sunflower (planted 2 weeks before the squash) can delay leaffooted bug and stink bug feeding on vegetables and allow longer harvest time. Avoid leaving tomato fruits to rot on the vine and keep the garden weed free. If needed, apply a recommended insecticide after confirming the pest species.

Harvesting Your Own Groceries

To ensure high-quality, nutritious vegetables from your home garden and to prevent waste, proper harvesting at the right stage is essential. Harvest these vegetables when they exhibit the following characteristics:

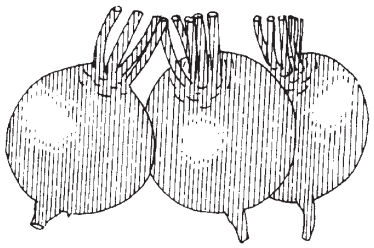


ASPARAGUS—When spears are 6 to 8 inches tall before the tips start to open. Break off stems above the soil line.

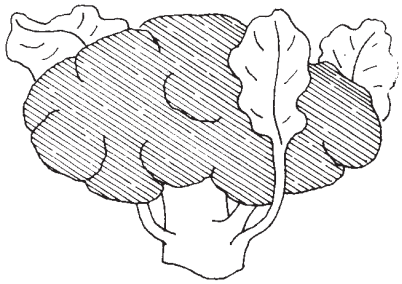


BEANS, SNAP—When pods are almost full size but before seeds begin to bulge, usually when seeds are the size of pin heads.

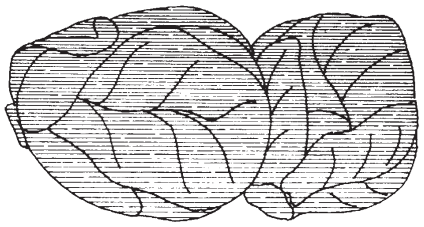
BEANS, LIMA—When pods and seeds reach full size but are still fresh and juicy. Use only the seeds because the pods are tough and fibrous.



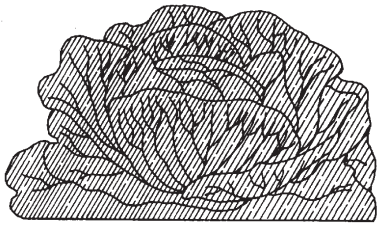
BEETS—As greens, when leaves are 4 to 6 inches long; as greens and small beets, when beets are 1 to 1½ inches in diameter; as beets only, when they are 1½ to 3 inches in diameter.



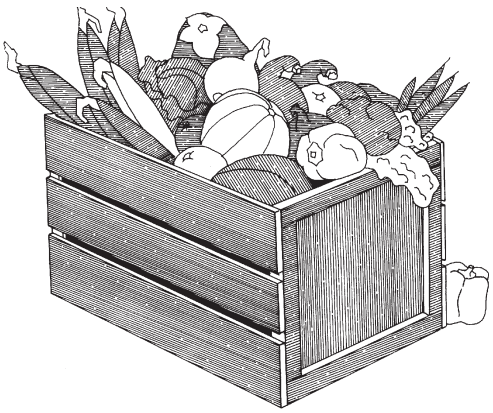
BROCCOLI—When flower heads are fully developed but before individual flower buds start to open. Cut off 6 to 7 inches below flower heads but do not discard small, tender leaves because they are very nutritious.

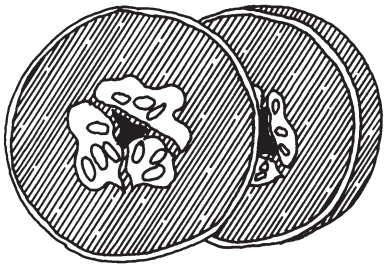


BRUSSELS SPROUTS—When sprouts (buds) at base of plant become solid. Remove buds higher on the plant as they become firm, but do not strip the leaves from the plants since they are necessary for further growth.

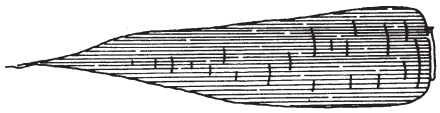


CABBAGE—When head becomes solid and firm. Excessive water uptake by the plant's roots causes splitting. To prevent splitting of mature heads, twist plants enough to break several roots.

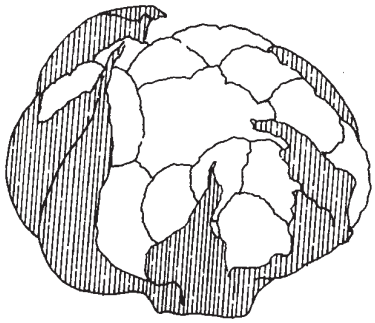




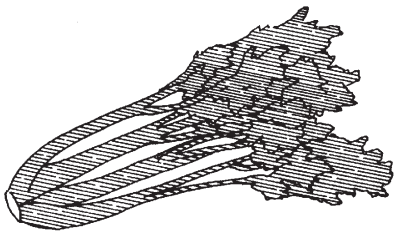
CANTALOUPES—When base of fruit stem starts to separate from fruit. Fruit will be nearly ripe when separation starts and fully ripe when a crack appears completely around the base of the fruit stem.



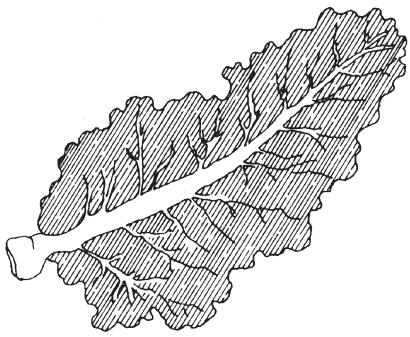
CARROTS—When small and succulent, about ¾ to 1 inch in diameter. During cool, dry periods carrots may be left in the ground for later harvest.



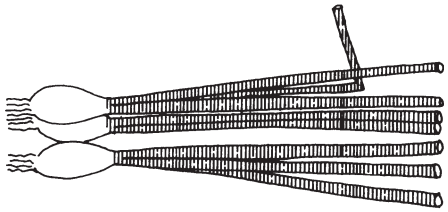
CAULIFLOWER—When curds (aborted flower heads) are full size (6 to 8 inches) but still compact, white, and smooth. Curds exposed to sunlight become cream colored, rough in appearance, and coarse in texture.



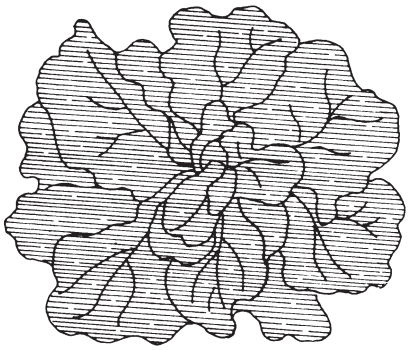
CELERY—When plants become 12 to 15 inches tall. While young and tender, the lowest leaves (8 to 10 inches long) may be removed from a few plants and used in salads, soups, and cooked dishes.



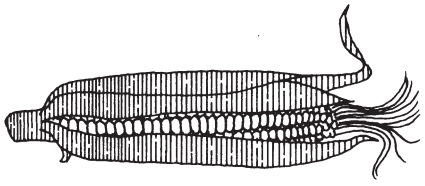
CHARD—When 6 to 8 inches tall, to thin out plants. Thereafter, remove only outer, older leaves as they become 8 to 10 inches long. New leaves will continue to grow for a continuous harvest of young, tender chard.



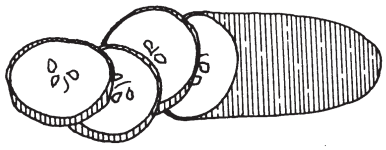
CHIVES—As new leaves appear in early spring; break off at the ground level. Use young, tender leaves throughout the season.



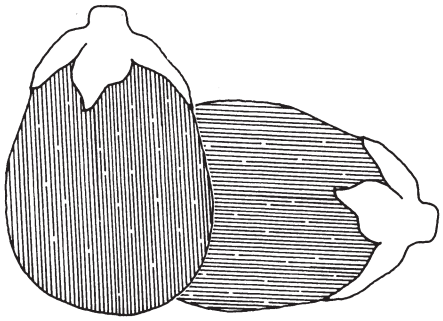
COLLARDS—When outer leaves become 8 to 10 inches long. New growth from the center of each plant will provide a continuous harvest of young, tender leaves.



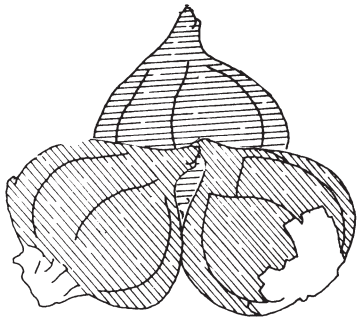
CORN, SWEET—When kernels are filled out well in the milk stage. This is about 18 to 21 days from silking. Avoid high temperatures when gathering. The cool of the morning is a desirable time.



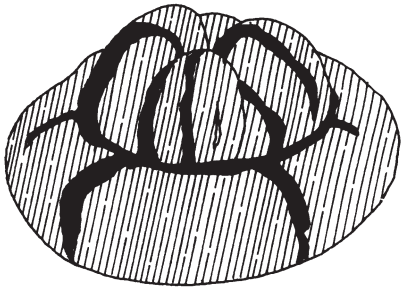
CUCUMBERS—For sweet pickles, when fruits are 1½ to 2½ inches long; for dills, when fruits are 3 to 4 inches long; for slicing, when fruits are near full size (generally 6 to 9 inches) but are still bright green and firm. Older fruits will be dull in color, less crisp, may have objectionable seeds, and result in lower yields.



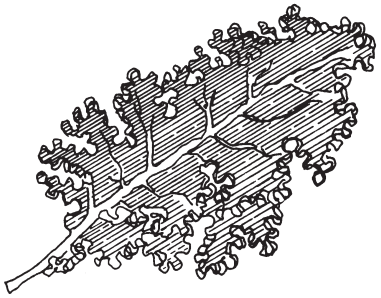
EGGPLANTS—When fruits are near full size (approximately 4 to 6 inches in diameter) but still firm and bright in color. Older fruits become dull in color, soft, and seedy.



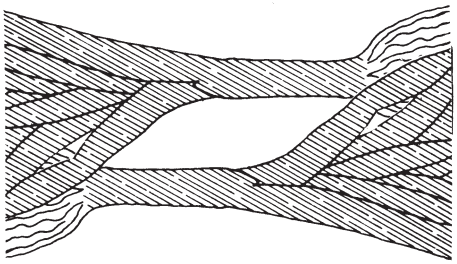
GARLIC—When foliage loses color and tops begin to fall over.



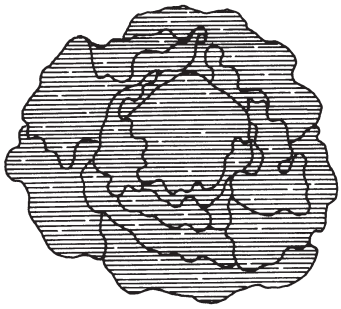
GOURDS—Edible varieties, when fruits are 8 to 10 inches long and are young and tender; ornamental varieties, when fruits are mature and full colored but before first fall frost.



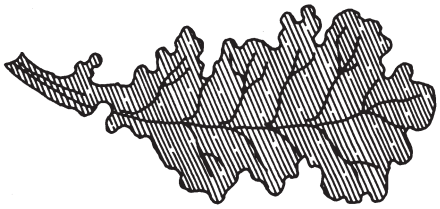
KALE—As outer leaves become 8 to 10 inches long. New leaves will continue to grow from the center of each plant for a continuous harvest.



LEEKS—When 1 to 1⅓ inches in diameter but before fall frosts.

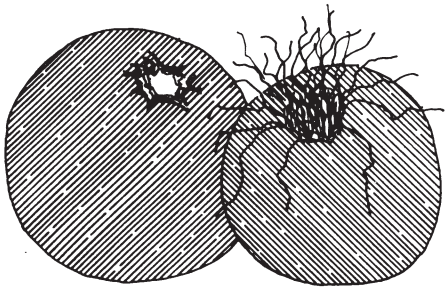


LETTUCE—Leaf varieties, when outer, older leaves are 4 to 6 inches long; heading varieties, when heads are moderately firm. Outer, older leaves may be taken from plants of either leaf or head lettuce as soon as the leaves are 4 to 6 inches long. New leaves will provide a continuous harvest of tender, tasty lettuce until hot weather brings on bitter flavor and seed stalks start.

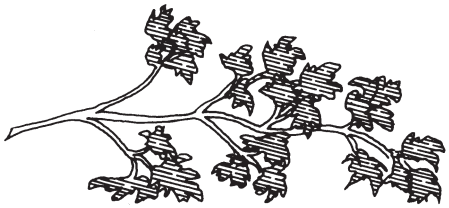


MUSTARD—Outer leaves, when 6 to 8 inches long. New leaves will provide continuous harvest until flavor becomes strong and leaves become tough in texture from hot weather. Seed again in late summer for milder flavor and tender texture.

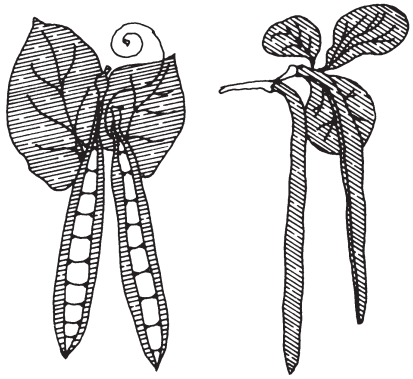
OKRA—Before pods reach the hollow and puffy stage and while easy to cut from stalk. Continue harvesting or they will quit producing.



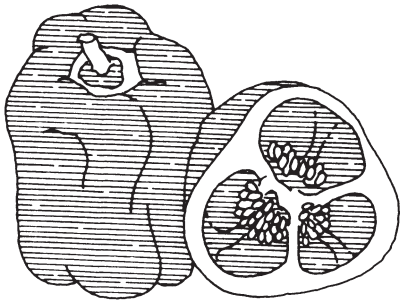
ONIONS—For green onions, harvest when 6 to 8 inches tall. Harvest any with round, hollow seed stalks as soon as these stalks appear. For bulbs, harvest when tops fall over and begin to dry. Pull with tops on and dry them in a protected place, cutting tops 1 inch above bulb for further drying.



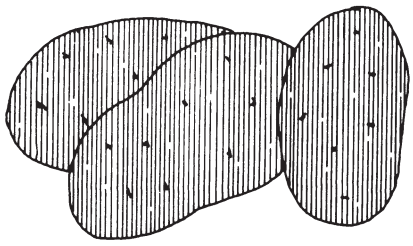
PARSLEY—When older leaves are 3 to 5 inches long. Continue to take outer leaves for fresh, tender parsley until heavy frosts of winter.



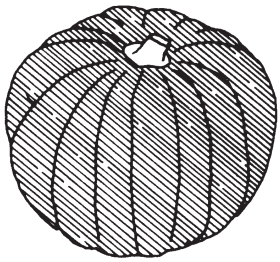
PEAS—When pods are fully developed but still bright green. Harvest edible-podded varieties (snow, Chinese) when pods reach near full size (about 3 inches) and before seeds show appreciable enlargement. If only seeds are to be eaten, harvest when seeds are fully developed but pods are still fresh and bright green.



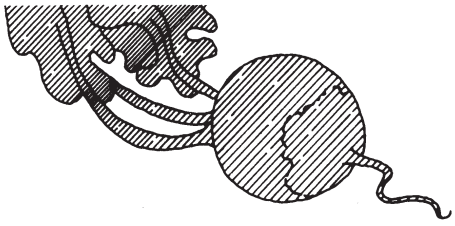
PEPPERS—When fruits are firm. In 2 to 3 weeks, ripe peppers will be fully colored.



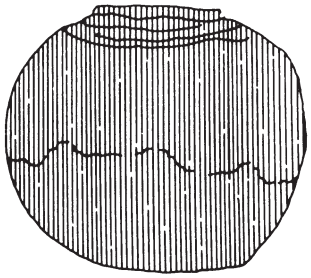
POTATOES—When potatoes are full size and the skin is firm. New potatoes may be harvested at any size but generally are not dug before they are 1¼ to 1½ inches in diameter.



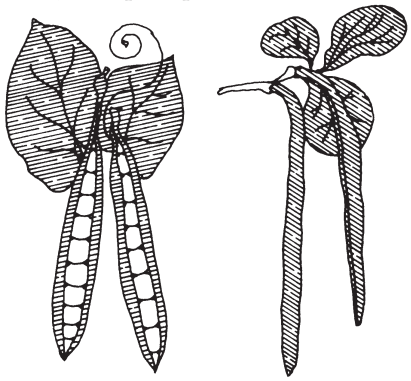
PUMPKINS—When the fruits are full size, the rind is firm and glossy, and the bottom of the fruit (portion touching the soil) is cream to orange color.



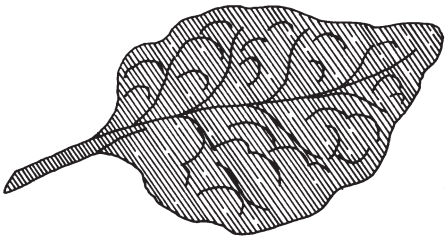
RADISHES—When roots are 1 to 1½ inches in diameter.



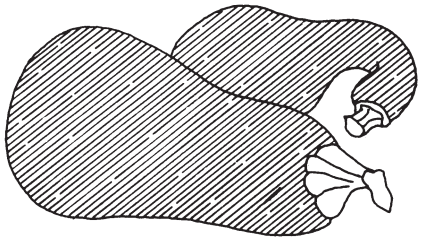
RUTABAGAS—When roots reach full size, but before heavy fall frosts. Thin early to ensure rapid, uniform growth and highest quality.



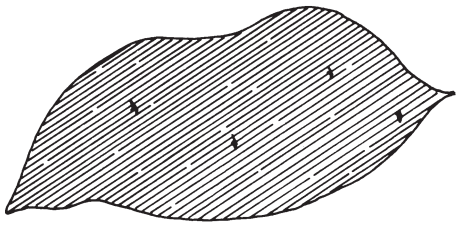
SOUTHERNPEAS—When seeds are near full size, but still bright green; as mature or dry seeds, when seeds are full size and dry. Dry seeds may be cooked, baked, or used in soups.



SPINACH—When large leaves are 4 to 6 inches long. Pull larger, whole plants or harvest older leaves and allow new growth to develop.

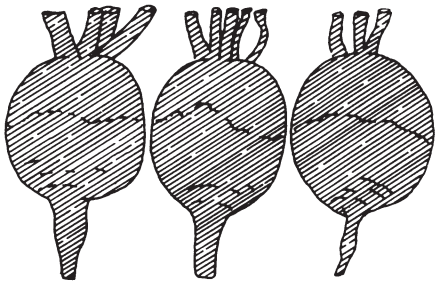


SQUASH—When seeds and fruit are small. Continue harvesting, or flowering ceases. Winter squash is harvested when fruits are full size the rind is firm and glossy, and the bottom of the fruit is cream to orange color. Light frost will not damage fruits of winter-type squash.

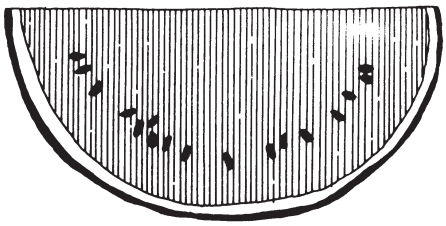


SWEETPOTATOES—Late in the fall but before the first early frost. Lift to avoid cuts, bruises, and broken roots. Cure in a warm, well-ventilated place for 2 to 3 weeks.

TOMATOES—When fruits are fully colored. Pick only fully ripe tomatoes for juice or canning to ensure full flavor, good color, and maximum sugar content.



TURNIPS—When roots are 2 to 2½ inches in diameter but before heavy fall frosts. For greens, harvest leaves 4 to 6 inches in length.



WATERMELONS—When fruits are full size, dull in color, and the bottom (portion touching the soil) turns from greenish white to cream color.

Additional Harvesting and Storage Tips

The time of day you harvest vegetables from your garden can influence their quality. Harvest all leafy vegetables, including herbs, in early morning while they still glisten with dew.

Harvest the following vegetables as close to preparation and meal time as possible: asparagus, beans, all root vegetables, broccoli, Brussels sprouts, cabbage, cauliflower, cucumbers, eggplant, kohlrabi, leeks, okra, peas, peppers, summer squash, sweet corn, tomatoes, and southern peas.

Handle fresh vegetables carefully to avoid cutting, breaking, or bruising them. After harvesting, store them in plastic bags or covered containers in the refrigerator or a cool place to prevent water loss and wilting.

If you plan to freeze or can your garden produce, harvest just before preparing it for preservation. You will have a high-quality finished product if you start with very fresh vegetables.

Partial List of Organic Insecticides for the Vegetable Garden

Active Ingredient	Some Trade Names	Insects Controlled	Hints for Use
Bacillus thuringiensis (B.t.)	Variety kurstaki: Dipel, Thuricide, M-Peril, Biobit, Bactospeine, Caterpillar Attack	Many caterpillar species including armyworms, loopers, cabbageworms	Insects must eat material, so good spray coverage is essential. More effective against small than large larvae. Do not apply during cool weather.
Bacillus thuringiensis (B.t.)	Variety tenebrionis or san diego: M-One, M-Trak, Novodor, Foil, Trident	Controls only Colorado potato beetle larvae	See above.
Insecticidal soaps	Safer Insecticidal Soap, M-Pede, Safer Insect Killer	Soft-bodied insects such as aphids, whiteflies, mealybugs, mites	Frequent sprays may be necessary. Direct spray to insects on leaf undersides. High concentrations may burn plants (test a few before spraying the entire garden).
Pyrethrins	Butacide and Pyrenone Crop Spray are mixed with a synergist (PBO) to increase activity.	A wide range of insects including caterpillars, beetles, and true bugs	Acts on contact causing "quick knockdown." Formulations with piperonyl butoxide and rotenone improve control. Do not mix with insecticidal soaps.
Spinosad	Bonide Spinosad Spray Monterey Garden Insect Spray	Caterpillars, thrips, leaf miners, Colorado potato beetle, and others	Good spray coverage essential. Must be eaten by insect. Avoid spraying when bees are active. Highly toxic to bees.

For more information

www.aces.edu/go/326
ANR-0030, "Nematode Control in the Home Garden"

www.aces.edu/go/327
ANR-0047, "Alabama Gardener's Calendar"

www.aces.edu/go/328
ANR-0302, "Backyard Tomato Production"

www.aces.edu/go/329
ANR-1059, "Blossom-End Rot in Tomatoes"

www.aces.edu/go/330
ANR-1060, "Pruning Fresh Market Tomatoes"

www.aces.edu/go/331
ANR-1112, "Rejuvenating Okra"

www.aces.edu/go/332
ANR-1254, "Crop Rotation: An Essential Part of Planning a Home Garden"

www.aces.edu/go/334
ANR-1423, "Keys to Producing and Selecting Quality Vegetable Transplants"

www.aces.edu/go/335
ANR-1422, "Basics of Fall Vegetable Gardening"

www.aces.edu/directory
Alabama Cooperative Extension System County Offices, Departments, Units

www.aces.edu
Alabama Cooperative Extension System home page
More publications and information on specific vegetables or crops

Notes

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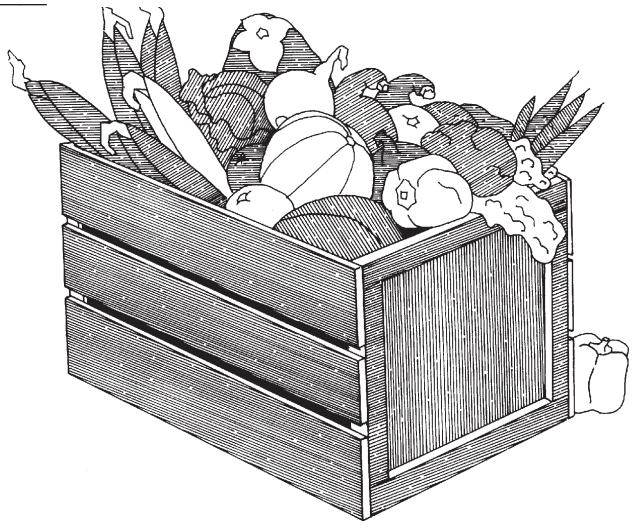
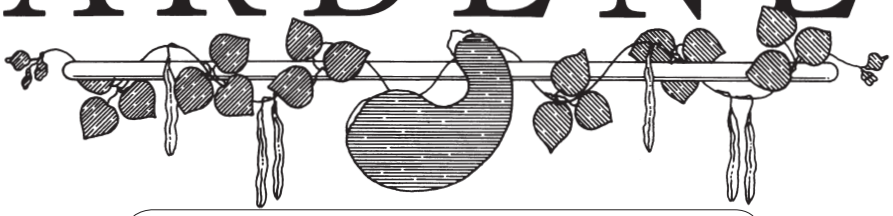


THE ALABAMA VEGETABLE GARDENER



Luscious, fresh, homegrown vegetables can be raised by most Alabamians. Careful planning, hard work, and attention to details and the information in this publication will help make you successful. The reasons for gardening vary. It can be a recreational activity, it's good exercise, and you can take part regardless of your age or background. Gardening is therapeutic; the sunshine, clean air, and growing plants add to your mental well-being. Gardening can also be your means of earning a little extra income. Whatever your reasons, your reward will be good vegetables.

Kerry Smith, *Extension Home Horticulture Associate;* **Ayanava Majumdar**, *Extension Entomologist;* **Charles Mitchell,** *Extension Agronomist,* Professor, Agronomy and Soils; **John Everest,** Visiting Professor, Agronomy and Soils; **Edward Sikora,** *Extension Plant Pathologist,* Professor, Entomology and Plant Pathology; **Joseph Kemble,** *Extension Specialist,* Professor, Horticulture; all with Auburn University; and **Rufina Ward,** Research Entomologist, Natural Resources and Environmental Sciences, Alabama A&M University.

For more information, call your county Extension office. Look in your telephone book under your county's name to find the number.

Use pesticides only according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended only if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

Trade names are used only to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

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