COOPERATIVE EXTENSION SERVICE
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UNIVERSITY OF ALASKA FAIRBANKS

Gardening in Southeastern Alaska

Gardening in Southeast Alaska provides great recreational opportunities and some challenges. Successful gardeners learn to adapt to the unique climatic and sunlight conditions in this cool, maritime environment. Conditions in Southeast Alaska have much in common with the coastal areas of the Pacific Northwest except the day length during the growing season is increasingly longer traveling northward. With the long days, many plants from lower latitudes flower prematurely, or bolt. Spinach, beets and a number of other vegetable crops may bolt if suitable varieties are not planted. Day length also influences basic plant processes like germination and flowering (or bolting of some vegetable varieties), subsequently affecting fruit set, bud set and bulb set. When planning your garden, select varieties that are adapted to the long growing days (which become shorter after the summer solstice in June) and the cool growing season temperatures common to coastal Alaska — this will help in attaining gardening success.

The General Situation

Southeast Alaska receives an overabundance of rain throughout most of the year, with April and May usually the driest and sunniest months. Clouds shade the landscape and reduce sunlight intensity. The rain soaks the soil, reducing soil temperatures and inhibiting biological processes like the decomposition of soil organic matter. Based on air temperature and light, many Southeast communities have a four-month growing season or longer, but soil warming is slow and the cold soils effectively reduce the growing season. Successful Southeast gardeners manage soil moisture and fertility and modify the growing environment to extend the growing season.

A unique feature of Southeast Alaska is the poorly developed natural mineral soil. Soils naturally develop in place over a long period of time, influenced by slope, aspect to sunlight, climate and biological organisms. Southeast mineral soils are typically new in geological time, located on slopes and valley bottoms, and coarse-textured (sandy, gravely) with a low pH (acidic). On the other hand, soils found on many level and poorly-drained sites in Southeast are highly organic, containing little mineral soil. Organic soils have 12 to 18 percent organic matter by weight and are water-saturated much of the year. Mineral soils are usually found in the forested areas of Southeast and organic soils are found in muskeg.

The challenge for Southeast gardeners is draining water from the soil to increase aeration, thereby warming it to enhance soil chemical and biological processes. Raised garden beds are an effective, fairly simple technique to improve soil water drainage and aeration. Cold, acidic soils interfere with critical microbial processes involving the availability of essential plant nutrients. Soil fertility and acidity are determined by air drying samples of garden soils. These samples can be sent to laboratories recommended by your district Extension office and tested for pH and essential nutrients. The optimal pH range for mineral garden soil is 6.0 to 6.5 and the optimal pH range for organic soil is 5.5 to 6.0. Amending soils with lime according to soil test results will increase the soil pH and the availability of plant nutrients.

Many house lots in Southeast are built on gravel pads with no soil. In these situations, gardeners may purchase topsoil. Often the homeowner or soil supplier mixes a growing medium that includes peat moss, sand/gravel and compost. Peat moss retains water and nutrients while sand/gravel provides water drainage and air movement, and compost provides plant nutrients. A problem common to many gardens with man-made growing media is that the growing media mix varies among beds. Each different growing mix should be tested and managed separately. Make every effort to use one growing medium throughout the garden if the site lacks natural soil.

Compost breaks down and must be added to the growing medium every year. Peat moss does not readily break down and is not a source of nutrients itself, but it does hold water and nutrients. Examples of a good planting medium are one part (or less) coarse sand, one part peat moss and one part compost, or alternately, one part compost, one part coarse sand (or less), one part peat moss and, where available locally, one part mineral soil.

Tips on establishing gardens or planting beds on gravel pads

- Place crushed rock over the pit run or shot rock and course sand over the crushed rock.
- Soak the sand before topping off with eight to twelve inches of topsoil or growing media.

Preparing the Garden Site

Choose a garden site that gets the most sunlight throughout the day. Microclimate considerations are important in Alaska, where the sun is never directly overhead. The best site has maximum sunlight throughout the day as well as good air and water drainage. A south-facing site is preferable to an east- or west-facing site. Avoid north-facing garden sites, if possible.

If the garden location is flat, plant the rows lengthwise east and west to take full advantage of the sun. On slopes or hillsides always run the rows across the hill — never up and down — to reduce soil erosion. Once the site is ready, turn the soil over and break up large clods, preferably with a rototiller. At this point, fertilizer and lime, if needed, should be mixed into the soil based on soil test results.

Soil Fertility

Rapid plant growth places demands on the soil or growing medium. Mineral soils often have sufficient micronutrients but they may not be available for plant utilization if the soil is too acidic (below pH 5.5). Vegetables should be grown in containers for only one growing season, then recycled into the outdoor garden, or they may suffer from micronutrient deficiencies and disease buildup in the soil. Actively growing plants annually deplete primary nutrients (nitrogen, phosphorus and potassium, referred to as N-P-K). Soil nutrients may be replaced with commercial fertilizers, which usually have no micronutrients, or with organic products like compost, manure, fish by-products or other naturally occurring organic materials.

What kind of fertilizer should you use and in what amounts? One way to find the answer is to take a soil sample from your garden and have it tested. Contact your district Extension office for information on soil testing and recommended laboratories. Once you select the soil test lab, send one pint of moist sampled soil (growing medium) from each of your different garden areas to a laboratory for analysis. The lab report will be sent to you. Arrange

for your local Extension agent to review the soil test results and make recommendations for amending the soil to modify pH and nutrients. Soil recommendations using commercial (inorganic) fertilizers are straightforward. Inorganic fertilizers are formulated to be available to the plants shortly after mixing into the soil, as long as the soil pH and temperature are conducive for plant growth. Organic sources of nutrients are more difficult to quantify and generally take longer to become available to plants. It is important to carefully manage and monitor your soils to avoid nutrient excesses or deficiencies.

Inorganic fertilizers (fertilizers synthesized commercially with a guaranteed content of plant nutrients) can be used to correct nutrient shortages. Fertilizers with an N-P-K analysis of 8-32-16 are generally recommended for Southeast soils at a rate of 5 pounds fertilizer per 100 square feet of garden. In the case of 8-32-16 fertilizer, the bag contains 8 percent nitrogen (N), 32 percent phosphorous (P_2O_5) and 16 percent potassium or potash (K_2O) by weight. In other words, a 100-pound bag would have 8 pounds of N, 32 pounds of P_2O_5 and 16 pounds of K_2O. Organic and inorganic fertilizers with specific nutrient composition are available in garden stores and on the Internet.

Marketed organic fertilizers are generally more expensive than inorganic fertilizers and are generally less concentrated, requiring more product to be added per given area than synthetic fertilizers. Three typical organic fertilizers available in Alaska and commonly used are (1) blood meal (12 to 18 percent nitrogen), (2) bone meal (15 to 20 percent phosphorus) and (3) greensand (3 percent potassium) or wood ash (5 percent potassium). The application of 3 to 4 pounds of blood meal, 5 to 6.5 pounds of bone meal and 33 pounds of greensand or 20 pounds of wood ash per 100 square feet for established organic gardens is recommended.

Some organic fertilizers are available in much higher concentrations of phosphorus (42 percent P_2O_5) and potassium (60 percent K_2O); these have improved handling and dispensing requirements and much lower application rates than the standard organic fertilizers discussed above. Contact your local garden supply or Extension office for help in locating a source.

Expect to apply your annual fertilizer application in two parts. Apply the fertilizer (recommended rates described above) as you are preparing the soil for planting. Spread fertilizer uniformly onto the soil surface and rototill or spade into the top 6 inches of soil, ultimately forming a smooth seed bed. Apply a second "side-dressing application" in late July or early August. Make a furrow down the row 3 to 4 inches away from the base of your plants and apply the fertilizer in the furrow, covering it up with soil. This fertilizer booster application requires much less fertilizer (1 pound of 8-32-16 fertilizer per 100 square feet) and ensures that your plants have enough available nutrients to maximize fruit/vegetable development.

Soil Acidity and Liming

Native plants and shrubs, such as blueberry and devil's club, are adapted to acid soils. There are also a number of domestic flowers and shrubs which grow well in acid soil. Most garden vegetables, however, do best in mineral soil that is only slightly acidic (pH 6.0 to 6.5).

A pH reading of 7.0 is considered neutral, from 6.9 to 0.0 is acidic and 7.1 to 14 is alkaline. A pH of 4.0, not uncommon in muskeg, is very acid. Soil pH is measured on a logarithmic scale, so a pH of 6.0 is 10 times as acidic as a pH of 7.0 and a pH of 5.0 is 100 times more acidic than a neutral pH of 7.0.

When you give your Extension agent your soil analysis report, he or she will send you a recommendation for applying lime, *if* your soil pH value indicates a need for it. Do not add lime unless needed. It is preferred that you add lime in the autumn and till it into the top 6 inches of soil after your crop is harvested and before you close your garden for the winter. Lime breaks down slowly. Wood ash can be substituted for lime at the rate of 2 pounds of wood ash for every pound of lime recommended.

Lime sources include agricultural lime (100 percent $CaCO_3$), dolomite (110 percent $CaCO_3$ +Mg) and marine shells,which require more break-down time to be of use.

Organic Matter

Organic matter will improve the productivity of your garden if the soil is mostly gravel or sand. In addition to providing nutrients, organic matter improves the tilth, or structure, of the soil. Organic matter should be added as compost or peat moss and may make up to two-thirds of a soil or growing medium. Too much organic matter may increase moisture retention, resulting in cold soils. Fresh organic matter that is not composted will tie up nitrogen and other plant nutrients and increase soil acidity.

There are ways to avoid tying up nutrients. Compost the organic material before adding it to the soil, and add only moderate amounts of well-rotted compost to the soil at any one time. Finally, add lime with fresh organic matter to speed decomposition by maintaining a less acidic soil pH.

Amounts of Nitrogen, Phosphorous and Potash in Organic Fertilizers*

Organic Fertilizer	Lbs/100 lbs Nitrogen (N)	Dry Organic Phosphorous (P_2O_5)	Material Potash (K_2O)
Seaweed	1.5	1.0	5.0
Wood ashes**	0.0	1.5	8.0
Starfish	5.0	8.0	2.0
Peat moss	3.0	0.0	2.0
Horse manure	0.6	0.2	0.5
Chicken manure	1.6	1.3	0.5
Sawdust	0.0	0.0	1.0
Cooked fish scraps	8.0	13.0	4.0
Salmon meal	10.0	3.0	1.5
Crab meal	6.0	2.0	2.0
Bone meal	4.0	24.0	0.0

*Secondary and minor elements are also available from these materials, such as calcium (Ca), magnesium (Mg), sulphur (SO_3, SO_4), iron (Fe), manganese (Mn), boron (BO_3), molybdenum (MoO_4), copper (Cu), zinc (Zn), and chlorine (Cl). These are often lacking in Alaska soils.

**A more important function of ashes is their liming effect.

There are several abundant sources of organic matter in Southeastern Alaska:

Seaweed — If composted, this is a very good source of plant nutrients. The salt content usually will not harm garden plants. Protect your pile of seaweed from rain, which will leach out the nutrients. Add uncomposted seaweed to the garden at the end of the growing season.

Sawdust and wood chips — Old sawdust and wood chips that have been exposed to the weather for several years are a source of organic matter. Uncomposted sawdust and chips should be avoided since the microorganisms breaking them down will tie up the nitrogen in the soil and make it unavailable to plants. If sawdust or wood chips are applied to the garden, additional nitrogen fertilizer or lime should be added.

Leaves — A well rotted compost of alder, willow or other deciduous leaves makes a good organic fertilizer.

Manure — If available, composted animal manure provides major nutrients and trace elements and adds soil tilth. Be aware, however, that it may also be a source of weed seeds. It should be composted, and the pile should be protected to prevent leaching.

Drainage

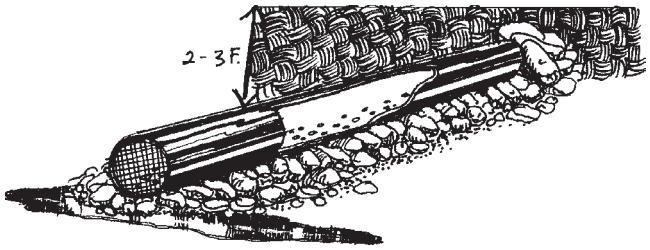
Wet soils are cold soils. Anything you can do to get rid of excess water will warm up the soil and improve plant growth. A seed germinates twice as fast in 60°F soil than in 50°F soil. This growth ratio holds throughout the rest of the growing season. There are several ways to provide drainage. These include:

Ditches — If there is someplace convenient to drain excess water, ditches and drain pipe may be effective.

1. An open inverted-vee ditch along the highest end of the garden will divert surface water around the garden.

2. French drains are sloping ditches backfilled with pea gravel placed over permeable fabric, then covered with a ¼-inch layer of newspaper or tar paper and capped off to ground level with 8 to 12 inches of topsoil.

Drainage Pipe — Perforated plastic pipe can also be installed for drainage. This pipe is lightweight, inexpensive and durable. It can be purchased from mail-order catalogs or local hardware stores. Place lengths of pipe in ditches 2 to 3 feet deep, sloping them toward a larger drainage area. Face the holes in the pipe down, so the water can move upward into the pipe. Arrange rocks at the upper end of the



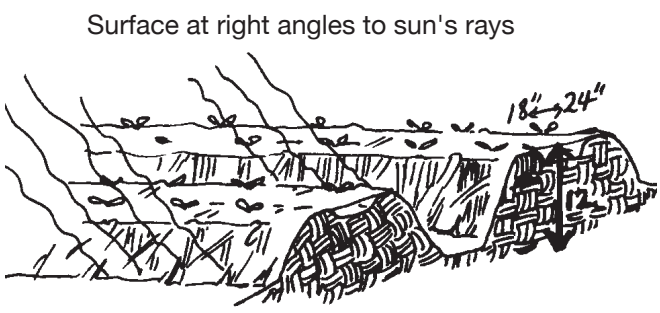
Drainage Pipe

pipe to keep it from filling with soil and a screen over the lower end to keep out small animals. Coarse gravel placed under the pipe will help prevent the holes becoming plugged with soil.

Raised Rows and Beds — Making raised beds or ridges across the garden will warm the soil. If the raised beds are wider than 4 feet, they will not warm up as fast, or as well. Raised beds often have a wood frame to contain the soil. Wood frame beds are a good choice when first setting a garden on a gravel pad. The wood used to construct raised beds should be naturally resistant to decay or it will decay within several years and need to be replaced.

Raised rows or ridges are especially effective in larger gardens. They take effort to build but will result in much improved plant growth. To be effective, ridges should be about 12 inches high and 18 to 24 inches across the top. Soil should warm up and dry out gradually. Narrow ridges drain and dry out too quickly. The sides of the ridge should slant with a 45-degree angle so they are at right angles to the sun's rays during the warmest part of the day. This will allow the soil to absorb the greatest amount of heat without drying out too quickly.

After working in the correct amount of fertilizer and lime, set a row of stakes across the garden to mark



Raised Rows or Ridges

the center of the first ridge. Follow the contour. Start at the bottom of a sloping garden and work up the slope, always running the beds across the slope on a contour. Pull in the soil from both sides until you have a ridge 12 inches high and 18 to 24 inches across the top. Set the stakes for the next row far enough from the first so that there will be enough soil to make it. It usually takes at least 5 feet, but you will plant two rows of seed on each ridge.

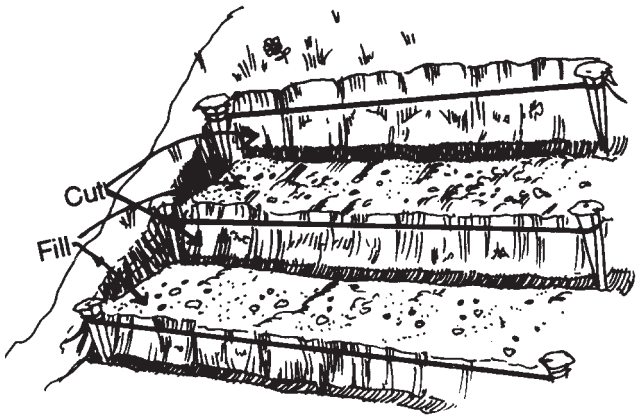
Level the tops of the ridges and plant seeds or set transplants in rows about 4 to 6 inches from the center of the ridge. Be sure to firm the soil over the seeds and around the transplants because the soil will dry rather quickly at the surface.

Be prepared for one major problem: with heavy rain the ridges may wash down and settle. If the soil or growing medium contains about one-third coarse sand, the soil should drain sufficiently to prevent the raised bed from eroding.

Terracing — For gardens on moderate to steep hillsides, terracing may be the best answer to drainage problems. Terraced gardens are better drained and warmer than unterraced ones. The narrower the terraces are, the more this is true.

The steepness of the slope determines the width of terrace. Wide terraces with space for four or more rows are best for gentle slopes up to 10 degrees. Two- or three-row terraces are best for intermediate slopes.

To lay out your terrace, set a stake and attach a cord at the level of the lowest terrace. Now take the cord to the far end of the garden and attach it to a second stake so that you have a level reference line. By leveling back to the slope at intermediate points from your reference line, you can see where the finished surface should be. The fill you use to make a terrace comes from the back of each terrace. Make the front rise of the terrace just high enough to use the fill cut from the back. When building terraces, allow ample room to walk and stand so that work on the next terrace can be done easily. All types of terraces should have a flat, level surface and should follow the contour of the hill. A drainage ditch on the hill side of each terrace may help to prevent erosion and improve drainage.



Terrace Layout

Adding Sand and Gravel to Poorly Drained Soils — Coarse sand and/or fine gravel will improve the structure and drainage of heavy clay and muskeg soils. They should be worked well into the soil in moderate amounts.

Starting Your Garden

The preferred vegetable garden strategy in Southeast Alaska is to start most seeds indoors six weeks before the expected last spring frost. Planting transplants at the start of the season instead of waiting for seeds to germinate and grow in the cool soils allows more growing time for your garden. You can transplant vegetables such as cabbage, lettuce, kale, cauliflower, broccoli and squash. If you have the time and space to grow transplants and if you follow the proper procedures, you can gain considerable time during the growing season. For complete information on transplants, see the Extension publication HGA-00032, *Seed Starting and Transplanting*.

Cover rows with floating fabric cloth or plastic row covers that are ventilated to warm the soil and the plant-growing environment. Some crops, like carrot and radish seeds and potato pieces can be planted directly into the soil once the threat of frost is passed. If direct seeding is done, it will be necessary to thin the rows of young seedlings after they appear above ground. This step is necessary to ensure fast growth and optimum size. Many vegetables, such as beets, can be used as greens as they are thinned.

For a current list of recommended vegetable varieties, see Extension publication HGA-00231, *Recommended Variety List for Southeastern Alaska*. It is important to use a recommended variety that will mature early and under cool conditions. Local successful gardeners are another source of information on the crops and varieties best suited for your area.

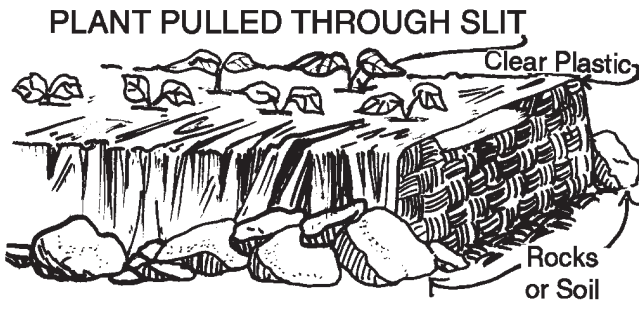
Perennial crops like asparagus, garlic, rhubarb, Jerusalem artichoke and perennial herbs should be planted together in one part of the garden where they will grow from season to season.

Treated Seeds

When seeds sprout, the young shoots are often attacked by fungi and other microorganisms. Some of these soil organisms start growing before the seeds sprout and are ready to attack the young growth as it emerges from its protective seed coat. In wet soils, many seedlings are killed by these microorganisms. The disease is called damping off. Contact your district Extension office for recommendations on how to prevent or reduce damping off in seedlings. Most seed companies treat seeds with a protective fungicide before they are packaged.

Pest Control

Gardens in Southeast are susceptible to insect pests, plant disease, weeds and vertebrate pests. Practice integrated pest management (IPM) in managing garden pests. Cooperative Extension Service provides a variety of resources to assist with IPM. IPM is based on proper identification of suspected pests, interrupting a known pest's life cycle when it is most susceptible, regular monitoring of the garden for early detection of pests, verifying control techniques, and keeping records of pests found and control actions taken. Some pests common to Southeast include the following:



Clear Plastic Mulch

Aphids — Small, soft-bodied winged or wingless insects. Aphids injure plants by sucking their juices and spreading viral diseases. Contact your district Extension office for control recommendations.

Cutworms — The larvae of small moths. Cutworms travel just under the surface of the soil or on top of it. They feed on a variety of vegetable crops. One control measure that has proved helpful is a band of metal placed around the stems of the young plants. The metal band — a No. 1 tin can with top and bottom removed — is a barrier to the cutworms. Contact your district Extension office for other control recommendations.

Root Maggots — These destructive insects attack turnips, radishes, cabbage, cauliflower and broccoli from late May through July. They are the larvae of a fly. Extension publication PMC-00330, *Root Maggots in Alaska Home Gardens*, provides important control recommendations.

Slugs — These mollusks are a continuing problem for vegetable gardeners in Southeastern Alaska. Read and follow the recommendations in the Extension publication PMC-10070, *Slugs*.

Weed Control

High moisture and long days favor rapid weed growth in the Southeast garden. Begin weed control early and continue throughout the growing season.

Cultivation by hand or power tools must be shallow to avoid damage to plant roots. Hoeing and hand weeding are needed both in and between the rows. Chemical weed control is not recommended for beginning home gardeners.

Plastic mulches, other than those of clear plastic, for weed control are not practical for garden rows and beds in Southeast Alaska. Mulch between rows will reduce weeds and habitat for insect pests. Place several inches of wood chips, cardboard or newspaper flat on the ground between rows to control weeds without compromising the soil warming of the rows.

Plant Disease

Plant diseases caused by fungus, bacteria or viruses often thrive in the cool environment of Southeast Alaska. For plant disease to occur there needs to be a susceptible plant (there is great variability between crops and varieties toward specific diseases), a virulent pathogen and a favorable environment. These three factors explain why plant diseases vary in intensity and type from season to season. Some diseases of fruits and vegetables in Southeast include damping off, downy mildew, soft rot, powdery mildew, vascular wilt, rust and scab. The best strategy to control plant diseases is to plant disease-resistant plants and maintain plant health. Once disease shows up, cut out and destroy the diseased plant part or destroy the entire diseased plant. There are few pesticides available for the gardener to control plant disease once it becomes established.

Vertebrate Pests

Ravens, deer, voles and rabbits all take their share of garden vegetables and fruit. Ravens often will pick out germinating seedlings or transplants soon after planting. Covering rows and beds with floating fabric cloth or plastic row covers will prevent most damage by ravens. Deer, especially, can create problems. A variety of repellents are available for deer control, but almost all emit an odor of rotten eggs. An 8-foot-high woven plastic deer fence, or a similar low voltage electric fence, will discourage most deer. It is important to set out repellents and fences early in the growing season so the vertebrate pests register the garden site as off limits before the crop matures.

Planting Suggestions for Selected Vegetables

ASPARAGUS	Plant one-year-old crowns 8 to 10 inches deep, 12 to 18 inches apart and in rows 4 to 6 feet apart.
BEETS	Beets will do well with some well composted seaweed added to the soil along with the regular fertilizer.
BROCCOLI	Plant in rows 18 inches apart; thin plants to 18 inches apart.
CABBAGE	Select a nonbolting variety (one which will not go to seed early in the season). Allow 3 or more square feet per plant.
CARROTS	Plant in rows 18 inches apart; thin to 3 to 4 inches between plants.
CAULIFLOWER	Thin so that the plants grow in an area 2 feet by 1½ feet to allow enough room.
SWISS CHARD	Thin 8 to 10 inches apart while still in the seedling stage.
HEAD LETTUCE	Plant in rows 2 feet apart; thin to 1 foot apart.
ONIONS	Green onions are grown from seed; dry onions are grown from sets. Set in shallow trench. Space 4 to 5 inches apart; thin to 4 inches apart.
ENDIVE	Plant in rows 16 inches apart; thin plants to 16 inches apart.
KALE	Plant like cauliflower.
LEAF LETTUCE	Plant rows 12 inches apart; thin to 18 inches apart.
PARSNIPS	Plant seeds in rows 16 inches apart; thin to 6 inches apart.
PEAS	To plant peas, dig a furrow about 1 inch deep. Scatter the pea seed down the furrow. Cover the seed with a half inch of soil and pack by tamping with the rake or hoe. Tamping insures good contact between the seed and moist soil. A good stand of peas should have plants every inch.
POTATOES	Plant in rows 3 feet apart; 18 inches apart in the row. Hill as needed to keep the tubers covered. Green sprouting can be used to decrease the amount of time required for emergence.
RADISHES	Plant in rows 6 inches apart; thin to 1 inch apart in the row.
RUTABAGA	Thin to 12 inches apart.
TURNIP	Thin to 8 inches apart.
ZUCCHINI	Grow through clear plastic for best results.

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