



GROWING STRAWBERRIES IN YOUR HOME GARDEN

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Growing strawberries in your home garden can be an interesting and rewarding experience. By growing various cultivars (varieties) of strawberry you can pick ripe fruit from late spring until frost in the fall. If you care for plants properly, you can obtain enough berries for your family from a relatively small area.

SELECTING A SITE

Strawberries require direct, full sunlight for best production. They bloom early in the spring, so don't plant them in frost pockets—low-lying areas in which cold air drains or areas (surrounded by tall trees, for example) where cold air is trapped.

Avoid planting where tomatoes, peppers, potatoes, eggplant, strawberries, raspberries, or blackberries have grown in the past 3 years. These plants can all act as hosts for fungi, such as *Verticillium* wilt, and insect pests that build up in the soil unless you place these crops on at least a 3-year rotation schedule.

Strawberry plantings can remain productive for 3 to 4 fruiting years. You can minimize the buildup of many insect and disease problems by rotating the strawberry patch from one site to another each time you make a new planting.

Soils. A well-drained loam soil, high in organic matter, is ideal. Avoid planting in heavy clay soils. If your soil is sandy, pay more

careful attention to watering and fertilization. However, strawberries will tolerate a wide range of soil types if you properly modify the soil. You can improve most garden soils by adding organic matter.

The soil should be well-drained—strawberries can't tolerate standing water or "wet feet." If the only soil you have available has poor drainage, you may be able to improve it by tiling and adding organic matter. Planting on ridges or raised beds also helps if soils drain poorly (see "Preparing the soil" and "Planting systems").

SELECTING A CULTIVAR

Strawberry cultivars are normally placed in one of three categories (or types), based on their responses to day length (photoperiod) and the season in which they produce a crop: June-bearers, everbearers, and day-neutrals.

June-bearers produce one crop a year, usually from early June to July. These plants produce flowers, fruits, and runners (daughter plants produced on aboveground stems) in sequence. Most commercial plantings are of June-bearing cultivars.

Everbearing types produce two crops a year, one in June and one in the fall. Everbearers usually produce few runners.

Day-neutrals produce a relatively continuous crop throughout the growing season.

The fruit of everbearers and day-neutrals is typically smaller, and total seasonal yields are often lower, than that of June-bearers. However, the advantage in growing these types along with the June-bearers is that you can harvest fruit for most of the growing season.

Strawberry cultivars are very much adapted to certain climatic conditions. Cultivars that haven't been tested in Oregon or that aren't adapted to this region aren't recommended.

June-bearers

Sumas. Season: early to mid. Fruit: large with medium-red, bright, glossy external and internal color; easy to cap but less firm than Totem.

Hood. Season: early to mid. Fruit: large, bright, red, firm and easy to cap; poor texture for freezing but very good for preserves and suitable for fresh; plants are susceptible to

Types of strawberries:

1. *June-bearers*
 - one crop per year (June-July)
 - produce many runners
2. *Everbearers*
 - two crops per year (June-July and fall)
 - produce few runners
3. *Day-neutrals*
 - crop almost continuously (June until frost in the fall)
 - produce few runners

You can choose from various cultivars (varieties) available for each type of strawberry.

virus; similar to Marshall, which is no longer commercially available.

Shuksan. Season: mid. Fruit: large, glossy, bright red with a tough skin; firm and not as easily capped as Olympus and Hood; good quality for frozen pack and preserves; suitable for fresh.

Totem. Season: mid. Fruit: large, attractive, dark red with uniform red internal color; caps easily, firm; good for frozen pack and fresh; a little dark in color for best preserves.

Olympus. Season: mid. Fruit: small to medium, bright red throughout, moderately firm; good for frozen slice pack and preserves; unacceptable for fresh market.

Benton. Season: mid to late. Fruit: large, medium bright red color on exterior with moderately good red internal color; medium firm with mild flavor; doesn't cap as easily as Hood; preserve quality is similar to Hood.

Rainier. Season: late. Fruit: large, bright red throughout; ripens late and difficult to cap; excellent for frozen pack, preserves, and fresh.

Everbearers

Fort Laramie. Fruit: moderate fruit size, bright scarlet red and firm-fleshed; interior flesh is pink to scarlet; flavor is sweet.

Ozark Beauty. Fruit: large, sweet and good flavored; exterior color and flesh is bright red.

Quinault. Season: crops slightly in June and then moderately to heavily in July to

September. Fruit: large (up to 2 inches in diameter), solid crimson in color and glossy with a light interior that's soft to slightly spongy; large berries have an open center; somewhat difficult to cap; flavor is fair; poor for freezing and jam.

Day-neutrals

Fern. Fruit: larger and of better quality than Hecker; earlier fruiting than Hecker.

Hecker. Fruit: medium, dark-reddish orange; flavor and quality equal or superior to other earlier California introductions.

Selva. Fruit: large with slightly dark, bright, attractive skin; very firm; good flavor when ripe.

Tillikum. Fruit: small to medium with a glossy dark red skin and bright red flesh; average firmness.

Tristar. Fruit: small to medium, firm, glossy, deep red with good flavor.

ESTABLISHING YOUR PLANTING

Preparing the soil. A good supply of organic matter in the soil improves aeration and drainage, and increases water-holding capacity. You can apply organic matter the summer or fall of the year before you plant; manure applied at 2 to 3 bushels per 100 ft² is a good source.

You can also use compost, leaves, chopped hay or straw, peat moss, sawdust, etc. Take care to use only materials that you think are free of insects and weed seeds.

Dig, plow, or rototill the material into the soil to ensure that it will be well decomposed (rotted) by planting time the following spring. If you incorporate large amounts of non-decomposed (fresh) material into the soil, add ammonium nitrate (33% nitrogen) at 1 lb per 100 ft² to aid in decomposition.

Eliminate all perennial weeds the year before you plant. Don't let weeds go to seed!

The site you select and prepare should drain well. However, if drainage is poor, you can form ridges or raised beds. Mix organic matter, coarse sand, and fertilizer (see below) with the soil. Shape ridges or raised beds 8 to 10 inches high.

Make ridges wide enough to grow a single row of plants; raised beds should be wide

enough to accommodate double- or triple-wide rows in the hill system (see "Planting systems").

Fertilizing. Before you plant, apply 1 lb of 10-20-20 fertilizer per 100 ft². If you use a fertilizer with a different ratio, apply it on an equivalent basis—for example, 2 lb of 5-10-10 per 100 ft². Work the fertilizer into the upper 6 inches of soil. If you're going to set plants on ridges or raised beds, calculate only the area of the bed when incorporating fertilizer. If you used manure to improve soil structure, decrease the rate of fertilizer you apply by one-half.

Planting. When you plant or replant strawberries, begin with certified disease-free plants purchased from a reputable nursery. Avoid using runner plants from an old established patch—they're often diseased. Strawberries are subject to several virus diseases that are transmitted to the new runner plants, mainly by aphids.

Purchase plants just before planting. If you can't plant right away, store plants for a short period in a closed plastic bag in the refrigerator (34 to 40°F), or you can temporarily heel them into the soil.

To "heel in" plants, dig a shallow trench that's deep enough for the roots. Place plants in a single layer against one side of the trench with crowns (short stem of the strawberry plant) partially above the soil line. Cover roots with soil and gently firm it in place. Water the soil.

Keep plants moist before you plant, and plant in a damp, well-tilled soil. Don't leave plastic bags containing plants in the sun. If possible, plant on a cool, cloudy day.

Capping or hulling a strawberry fruit means removing the green stem and leafy part attached to the berry. You can do this by hand (long fingernails help!) or use a strawberry huller, available in most kitchen supply stores.

Note: Some cultivars are easier to cap than others. If you make a lot of preserves or freeze a lot of berries, you may want to consider this when you select a cultivar.

What if you find a cultivar that's not on this list?

Find out some of the plant growth and fruit characteristics:

- What type is it (June-bearer, everbearer, or day-neutral)?
- Does the nursery's description indicate the plant is susceptible to any diseases such as root rot or viruses?
- What's the fruit like—is it large, easy to cap, firm, and does it have good flavor, texture, and good internal and external color?

Remember: If you purchase a cultivar that isn't on this list, it probably hasn't been extensively tested in Oregon. It's best to try a few plants in your garden first, to see if they grow well and if you like the fruit.

Plant strawberries in early spring, as soon as you can prepare the soil. Use a spade, shovel, or trowel to set the plants. Dig a hole for each plant large enough to place the roots straight downward but somewhat spread. The midpoint of the crown should be level with the soil surface; the topmost root should be just below the soil surface (figure 1).

If you set plants too high, the roots may dry out. If you set them too low (figure 1), the growing tip at the top of the crown may smother and rot. Fill the hole with soil and press firmly around the roots—take care that no air pockets remain.

Irrigate the plants as soon as you set them.

Planting systems. The matted-row and hill systems are the most common training methods for strawberries. The hill system is preferred for everbearers and day-neutrals, because they don't produce as many runners as June-bearers. June-bearers are usually grown in a matted row, but you can also grow them in a hill system.

In the matted-row system, set plants 18 to 24 inches apart in the row (or raised bed), with

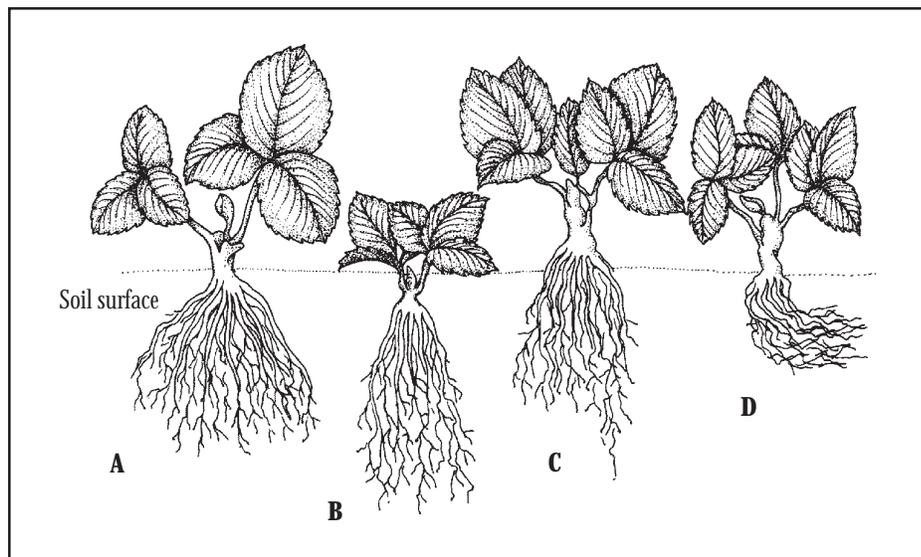


Figure 1.—Proper planting depth (A) and improper depths (B, C, D). In B, the crown is too deep; in C, the crown is too high; and in D, the roots are bent and remain near the surface.

3 to 4 feet between rows (figure 2). Allow the runners that form from these “mother” plants to develop and root—they’ll form a matted row 18 inches wide. Keep the remaining 1.5 to 2.5 feet between rows clear by sweeping early-formed runners into the row or by cutting off late-formed runners that grow into the aisle or off the edge of the raised bed.

The hill system is ideal for cultivars that produce few runners, such as everbearers. Set plants 12 to 15 inches apart in double- or triple-wide rows (on raised beds if necessary). Aisles should be 1.5 to 2 feet wide (figure 3). Remove all runners that develop throughout the growing season before they root.

FIRST SEASON'S CARE

Blossom removal. In June-bearers, remove all flower clusters during the planting year before fruit is formed. Be patient! If you try to produce strawberries during the planting year of June-bearers, you’ll stress the young plant. This limits crown and leaf growth, which will decrease the yield you get the following season.

In everbearers and day-neutrals, remove only the first flush of flowers, allowing flower clusters formed after July 1 to develop fruit. This allows plants to get well established before fruiting.

Runner removal. Cut off all runners every 2 to 3 weeks from plants growing in the hill system. In the matted-row system, the majority of the following season’s crop will come from the mother plants plus runners that develop and root before August.

Ideally, you should position runner plants as they develop to attain a density of about 5 runner plants per square foot of matted row. Place a small amount of soil just behind a runner plant to keep it in place. Once you achieve this density remove all other runners. (This is quite labor-intensive.)

Another method is simply to remove all unrooted runners from the matted row from September 1 through the fall, when runner production ceases. Matted rows that are too dense produce lower yields of smaller berries, have a larger proportion of misshapen berries, and have a higher incidence of disease.

Cultivation and weed control. Weeds compete with the shallow-rooted strawberry plant for water and nutrients, and they often harbor insects and diseases. Hoe around the plants often enough to destroy weeds and to keep the soil loose. This promotes good growth and permits runner plants to root quickly when establishing the matted row.

Check with your county office of the OSU Extension Service or a local garden supply store for herbicides registered for use on strawberries in home gardens.

You can use sawdust, bark, or black plastic mulch in the row to keep down weeds, conserve

What planting system should you choose?

- *In the matted row*, the runners produced are allowed to fill in a space 18 inches wide (figure 2).
- *In the hill system*, you must remove all runners that are produced.
- *Grow everbearers and day-neutrals in a hill system*, as these types produce few runners and won't form a nice matted row. You can grow June-bearers in either system.

Matted row versus hill system

- *The matted row* requires less labor to maintain and is productive. However, if you let the row get too dense, diseases such as fruit rot may become more of a problem and fruit size will be smaller.
- *The hill system* can produce both high yields and large fruit, provided you diligently remove all runners that are produced before they root. The plants will branch and become very productive.

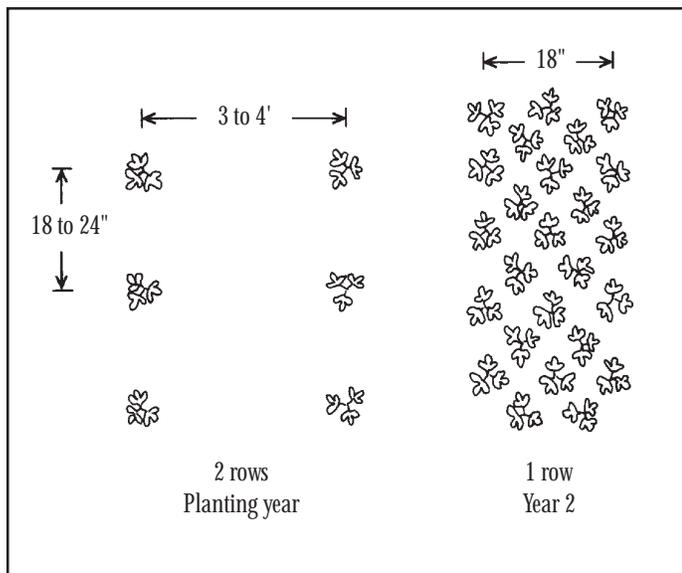


Figure 2.—Diagram of proper spacing in the matted-row planting system.

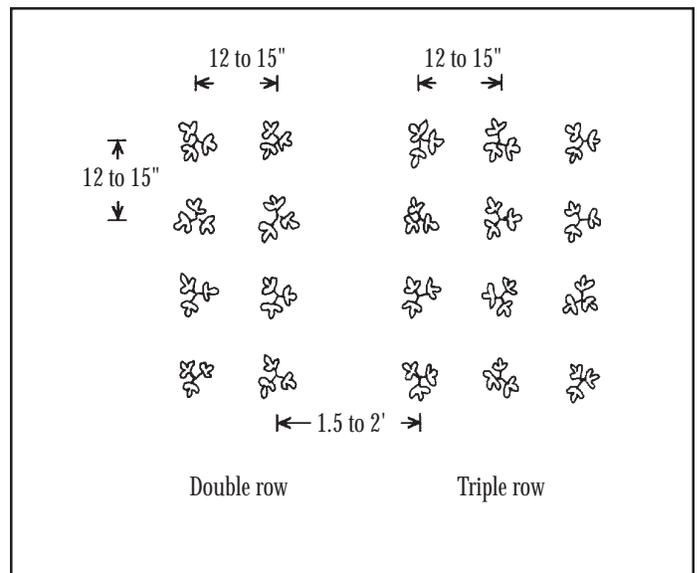


Figure 3.—Diagram of proper spacing in the hill system.

moisture, and keep fruit clean. However, mulches may lead to an increase in slugs.

Mulch is particularly useful for hill-system plantings. Avoid covering the top of the crown or growing point of plants with sawdust or bark mulch. Black plastic is very useful. Clear plastic isn't as suitable — weeds grow underneath it.

You can apply plastic most easily just before or just after planting. Before planting, place the plastic over the planting area or raised bed. Edges of plastic should overlap and be held down with soil. Cut circles with a diameter of 6

inches in the plastic where you'll set the plants. Plant through these holes.

If you lay plastic just after you plant, feel for the plants under the plastic and carefully cut holes around them. The holes cut in the plastic do allow some weeds to grow around the plants, but they're necessary to ensure that plants get enough water and for fertilization.

You can place a thin layer of bark mulch on the plastic to make the planting look more attractive. Runner plants can't root through the plastic, but you should still cut them off plants growing in the hill system.

Fertilizing. You may add additional nitrogen fertilizer 6 weeks after planting if plant growth is weak and leaves are light green. Broadcast ammonium nitrate (33% nitrogen) at a rate of $\frac{1}{2}$ lb per 100 ft² of row. Make a similar application in late July or early August if the plants lack vigor.

Broadcast the fertilizer when the foliage is *dry*—it sticks to wet leaves and can easily burn. Avoid broadcasting ammonium nitrate directly on crowns, or they may burn. You can remove fertilizer from plants by brushing and using sprinkler irrigation.

You may also band fertilizer 2 to 3 inches from both sides of the row and 2 to 3 inches deep.

If the soil is dry, it may be necessary to irrigate, to carry the fertilizer into the soil and to prevent toxic concentrations from forming.

Checklist for establishing your planting and care in the first year:

- Choose a good site.
- Eliminate all perennial weeds.
- Choose a cultivar(s) suitable for your needs.
- Choose a planting system.
- Prepare the soil by adding organic matter and forming raised beds, if necessary.
- Apply fertilizer.
- Till the soil.
- Purchase certified disease-free plants.
- Plant in the spring — set plants to the correct depth.
- Remove all flower clusters from June-bearers and the first flush of flowers from everbearers and day-neutrals.
- In the hill system, remove all runners as they form.
- In the matted row, train runners to the row (18 inches wide); remove all runners that form after September 1.
- Irrigate as required.

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label.
- **Bathe or shower** after each use.
- **Read** the pesticide label—even if you've used the pesticide before.
- **Follow closely** the instructions on the label (and any other directions you have).
- **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Watering. Strawberries are shallow-rooted. To obtain maximum growth and yield, they should never be stressed by lack of water. Keep newly set strawberry beds well irrigated throughout their first season. If you plan to develop a matted row, the earlier you can root down the runner plants, the more fruit buds they'll form for the following year's crop.

If you're maintaining plants as individuals in the hill system, the larger and more vigorous their crowns, the more fruit buds they'll set in late summer and fall.

CARE OF ESTABLISHED PLANTINGS

Winter and frost protection. In western Oregon, strawberry plants seldom need to be protected from winter cold. However, in areas east of the Cascades, it may be necessary to protect your plants from severe winter temperatures. Strawberry crowns and flower buds may be damaged or killed at temperatures colder than 22°F, and persistent alternate freezing and thawing can lift plants out of the soil.

You can minimize this damage by covering plants with 2 to 3 inches of loose straw after temperatures first drop below freezing. Remove straw once the risk of severely cold temperatures has passed. It's important to avoid placing straw on the plants too early or leaving it on too late in the spring.

Strawberry flowers may be killed if frost occurs during bloom. Frost-damaged flowers have black centers and produce either misshapen fruit or no fruit at all. If frost is forecast during bloom, protect a small strawberry planting by placing a sheet of spunbound polyethylene or light canvas over the plants. Place the cover on in the early evening and remove it in the morning once the risk of frost injury has passed.

Avoid using straw in areas, such as western Oregon, with mild winter temperatures and extended periods of rain. These conditions cause the plants to grow under the mulch and promote rot.

Weed control and cultivation. Keep the planting free of weeds by cultivation. Check with your county office of the OSU Extension Service or a garden supply store for herbicides registered for strawberries in the home garden.

Fertilizing. It's best to fertilize established strawberries in late summer to promote fall growth. Spring fertilization results in excessive leaf growth and runner formation and doesn't promote more or larger berries. After harvest, apply 2 to 3 lb of 10-10-10 (or equivalent well-balanced fertilizer) per 100 ft² of row. Foliage should be dry.

If you aren't mowing the plants (see "Renovation"), brush or wash the fertilizer off the leaves. You can also band fertilizer 2 to 3 inches from both sides of the row and 2 to 3 inches deep. Water the plants to carry the fertilizer down to the roots.

Watering. During the growing season, strawberries need about 1 inch of water per week. On sites with sandy soils or during very hot weather, plants may need more water. If rainfall isn't adequate to supply the necessary water, irrigate the plants.

Wet the soil to a depth of 6 to 8 inches with each irrigation. Avoid applying so much water that the soil remains saturated (excessively wet) for long periods. Standing water is harmful, even for a day or two.

After the first season, there are two critical times when good soil moisture is important. The first is from bloom through harvest, to ensure the berries swell to maximum possible size. The other is from late August through early fall, when plant growth resumes and flower buds for the following season's crop are formed.

Renovation. You can maintain a strawberry planting for several fruiting seasons if you properly manage and renovate it after harvest. If plants are vigorous and relatively free from weeds, insects and diseases, you may renovate a matted-row bed of June-bearers to prepare it for the next season. This is not recommended for day-neutrals or everbearers.

1. After the crop has been harvested, mow the foliage to about 2 inches above the top of the crowns. You can use hedge clippers or a rotary mower with the blade raised high. Be careful not to damage crowns. Remove all plant debris and burn or bury it.
2. Narrow the rows to a strip 8 to 10 inches wide using a rototiller, shovel, or hoe (go no deeper than 1 to 2 inches).

3. Thin out old and weak plants, leaving 1-year-old vigorous plants. The best plant density is about 5 to 6 plants per square foot of row.
4. Keep the planting weed-free by cultivating. Loose soil also promotes rooting of runners. If you narrowed the row below the width desired, allow the runners to fill the desired row width. Remove all excess runners as they form. Remove all runners that form after September 1—they won't have time to root and form flower buds for next season's crop.
5. Irrigate as required (see "Watering").

To renovate June-bearers in the hill system, mow off foliage above the crown, remove and burn or bury all plant debris, and remove all runners through the fall.

Remove all plantings that are no longer productive or lack vigor. If you want to make a new planting, plant in another location.

Checklist for taking care of your mature planting:

All types:

- Protect the planting from frost if possible (avoid planting in frost pockets or use covers).
- Cultivate to control weeds.
- Irrigate as required.
- In the hill system, remove all runners that form.
- In the matted-row system, train runners to the row (18 inches wide); remove all runners that form after September 1.

June-bearers:

- Pick fruit from June to July
- Renovate the planting or remove it if it's no longer productive.
- Fertilize.
- Irrigate if necessary.

Everbearers and day-neutrals:

- Pick fruit in June-July and in the fall (also throughout the rest of the season for day-neutrals).
- Remove the planting if it's no longer productive.
- Fertilize in the fall.
- Irrigate if necessary.

Starting the last producing year of an older planting prevents a gap in fruit production. Most plantings remain productive for 3 or 4 fruiting years.

NOVEL GROWING METHODS

You can also plant strawberries in barrels, planters, or hanging baskets. These plantings will require close care in watering, fertilizing, and other cultural requirements. You may find fruit production in hanging baskets disappointing.

Everbearing or day-neutral types are best suited for container production. The containers you choose should be well-drained. A possible soil mixture consists of 1 part sand, 1 part peat moss, and 2 parts garden soil. You can replace the peat moss with well-rotted manure or compost. Mix about ½ cup of complete fertilizer, such as 10-20-20, into each bushel of the growing medium.

HARVEST

Pick fruit every other day or daily during hot weather. Fruit harvested in the morning usually has a longer shelf life. Pick all ripe berries — fruit left on the plant become

overripe, which promotes development of disease and insect problems. You can refrigerate fruit for several days. Avoid washing fruit until just before you use it, to prevent softening and decay.

PESTS

If any diseases or insect pests become a problem — such as weevils or aphids — check with your county office of the OSU Extension Service for control recommendations.

The incidence and spread of fruit rot may be decreased by preventing a matted row planting from becoming too dense and by picking and discarding infected fruit.

This publication replaces EC 768. Trade-name cultivars are listed as illustrations only. The OSU Extension Service does not endorse any listed cultivar or intend any discrimination against others not listed.

Extension Service, Oregon State University, Corvallis, O.E. Smith, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the US. Department of Agriculture, and Oregon counties.

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