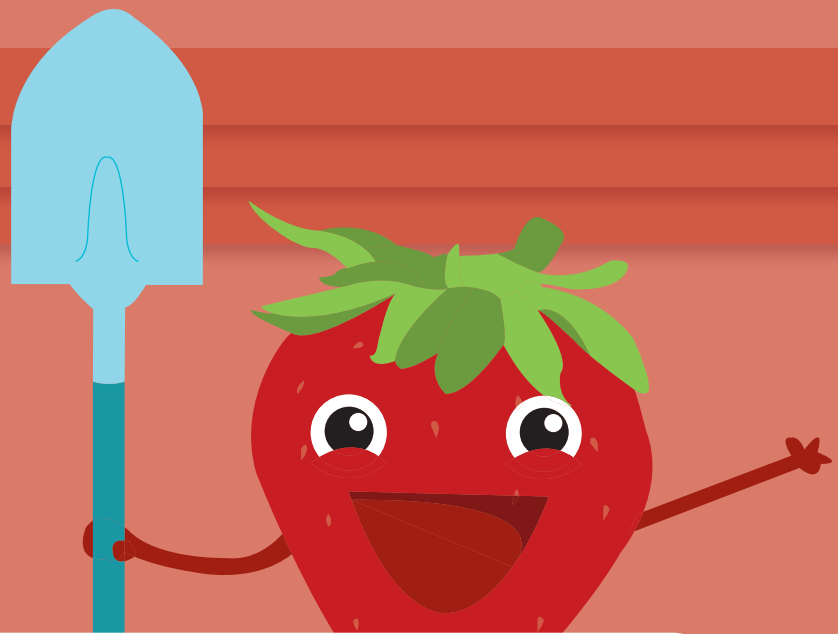


TEACH FROM THE GARDEN: STRAWBERRIES



Just Ripe for You



GROWING A SCHOOLYARD STRAWBERRY GARDEN

Schoolyard strawberry gardens provide rich spaces for students and teachers to explore concepts relevant to their curricula in a hands-on, experiential way. A strawberry garden, modeled on the annual hill production system used by farmers in the southeastern United States, fits neatly into the traditional-year calendar for elementary schools, with students beginning school in late August and finishing the year in June. This coincides with the southeastern strawberry production system in which strawberry plants are set into the ground between late September through early October, and the fruit is harvested in late April–early May. This growing schedule enables students to observe the life cycle of the strawberry plant throughout the school year.

A strawberry garden furnishes numerous benefits for students. The garden becomes a living laboratory, providing an integrated context to explore all subject areas. Science concepts such as plant growth and development can be easily studied and managed. Students can observe and discuss the relationships between plants and animals and their surrounding environments. Math, social studies, literacy, and health and wellness objectives can also be taught through the garden, with activities from weighing fruit to learning about the importance of strawberries to North Carolina. Life skills, including critical thinking, responsibility, communication, teamwork, citizenship, and a respect for nature, develop through nurturing a strawberry garden.

A strawberry garden affords an opportunity for youth who are disconnected from how fruits and vegetables are grown to understand the way food is produced. The simple act of cultivating a strawberry plant from a starter plant to a mature fruit-bearing plant imbues students with a proud sense of accomplishment. Tasting fruit fresh from the garden, which students have grown themselves, can encourage a lifetime preference for eating healthy food and a love of gardening.

STARTING A STRAWBERRY GARDEN



The Garden Team

The most successful school gardens are a team effort. Developing a garden team consisting of teachers, students, parents, farmers, Cooperative Extension personnel, and other community groups enables all members to share their strengths with the project and, as a result, makes strawberry gardening fun, successful, and sustainable.

- The teacher's role is to use the garden as a living medium for teaching math, literature, science, and critical 21st-century skills.
- Students can work with the teacher and other team members to figure out where to build the garden, find resource materials, and take care of the strawberry plants and harvest the strawberries.
- Parents can be stakeholders who acquire funds and donate labor and supplies for starting and maintaining the project (have a family be in charge of monitoring weather on the weekends, for example).
- Farmers can supply plants, plastic, drip tape, and row cover. They can visit the classroom to talk to the students about commercial strawberry production or invite the class to their farms on a field trip.
- Extension agents and master gardeners can provide technical assistance in growing the plants, finding a nearby strawberry farmer, and locating needed supplies.
- Other community members or organizations can help support the strawberry garden by publicizing the garden, offering in-kind donations of supplies, offering to water on the weekends, or providing funding.
- The North Carolina Strawberry Association can help teachers connect with farmers and offer suggestions for sources of plants and specialized supplies. The organization also publishes *Strawberry Time*, an activity book about strawberries for grades K-4, and has other resources for teachers at its website.

Gardens are most successful and sustainable when thoughtfully planned. Begin by obtaining the necessary permissions from the school administration. Determine which classes and teachers will be involved (more than one classroom can share the garden) and figure out how much garden space will be needed.

The garden can require minimal costs to install and maintain. Work with teachers and parents to solicit in-kind donations like supplies and labor. A number of small start-up grants are available for purchasing tools such as shovels, hoses, rakes, and watering cans. Create a plan to assign garden maintenance tasks such as weeding, watering, and harvesting.

STARTING A STRAWBERRY GARDEN



Locating a Good Garden Site

A successful strawberry garden requires suitable conditions. Your strawberry garden location should have the following:

- **Light:** The garden needs at least 8 hours of sunlight each day. Avoid sites with tall trees or buildings to their south due to the low angle of the sun in the winter.
- **Soil:** The garden must have well-drained soil. If the site has poor soil quality, adding compost will improve soil structure and nutrient availability.
- **A Raised Garden Bed:** Raised beds can be a way to provide a good growing medium for the strawberries. Beds should be at least 6 to 8 inches deep. There are a number of raised bed designs.
- **Space:** A single bed measuring 3 feet by 15 feet can contain 30 plants. Be sure to include room for pathways to walk and work around the beds. If a school has limited space, strawberries grow well in many different types of containers. Consider using one- to five-gallon pots or even growing strawberries directly in a bag of soil.
- **Water:** Make sure that there is access to potable water to irrigate the plants.

Strawberry Plants

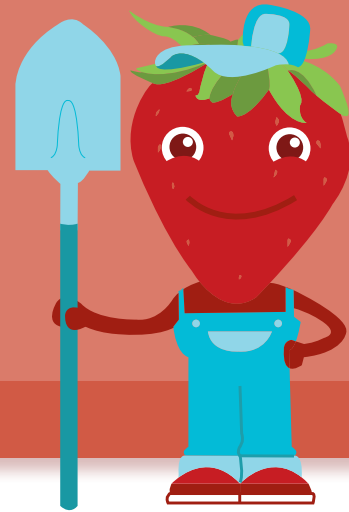
Strawberries should be planted as young plants (the easiest type to use are called “plug plants”) in the early fall (Fig. 1). They will grow throughout the fall, winter, and spring with fruit ready to harvest by April or May. In this system, strawberries are grown as an annual crop and will need to be replaced every fall. A local strawberry farmer may be willing to sell or donate plants for the garden. To locate a grower, contact your local Cooperative Extension agent, or visit <http://www.ncstrawberry.com/growers.cfm>. If you buy from a nursery or garden center, make sure you choose an appropriate variety. ‘Chandler’ variety plants will likely perform best in most parts of North Carolina. Other possible varieties include ‘Camarosa’, ‘Festival’, and ‘Sweet Charlie’. A flat of strawberry plugs usually contains 50 plants, though there may be a few empty holes or spindly plants. Use only strong healthy plants.



Figure 1: Plug plants

Strawberries are planted as plug plants in the fall of each year.

STARTING A STRAWBERRY GARDEN



Garden Soil

County Extension agents or Extension Master Gardeners can be helpful in preparing the soil for planting. They may encourage or help you to take a soil sample and have it analyzed to determine what nutrients need to be added to the soil. Soil sample analysis is free in North Carolina through the Department of Agriculture and Consumer Services. To learn how to properly take a soil sample, refer to this Extension bulletin: <http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-30/AG-439-30.pdf>. Once you know what your soil needs, the Extension agent or Master Gardener will be able to help you decide the best way to add any necessary nutrients.



Black Plastic

The southeastern strawberry production system uses a special black plastic to cover the soil. Made for farming, this plastic is very thin yet strong and flexible. The flexibility of the plastic allows you to gently stretch it over the soil without tearing. The black plastic warms the soil, acts as a mulch to suppress weeds and conserve water, and limits disease. Black plastic is usually 5 feet wide and comes in rolls. A strawberry farmer in your area may be willing to provide the small amount of plastic you need for minimal or no cost. Often growers have leftover lengths they might not need. It might also be obtained through farm supply stores or the NC Strawberry Association.



Row Covers

Row covers are made from non-woven, spunbonded material (the same as is used for facings in clothing). Placed over the strawberry plants, the covers will let in light and rain but help keep plants warmer in cold weather, especially if they are put on early in the day so the sun's heat can be trapped under them. Part of their effect comes from keeping off cold, harsh winds. Row covers can be obtained through your farmer connection, the NC Strawberry Association, a local farm supply store, or an online garden supply company. Weights of 1.0 to 1.5 oz./square foot are recommended.



Garden Tools

Common garden supplies or tools that will be needed are those that many people already have or may be able to borrow. These include trowels, shovels, rakes, hoses, sprinkling cans, a thermometer, and a rain gauge. The quantity of hand tools needed depends on how many students will be working at once. Not all of the supplies are needed when you first begin your garden. Ways to obtain tools without having to purchase them from classroom funds include donations by farmers, local or "big box" hardware stores, or other merchants. The strawberry garden project could also be sponsored by a local business or club or by parents.

TIMELINE OF GARDEN TASKS



August

CHOOSING AND PREPARING THE BED

- Talk about starting a strawberry garden and discuss how you will watch it grow all year.
- Pick a sunny location for your strawberry garden (Fig. 2).
- Test the soil where your garden will be. Obtain a soil test box and form from your local county Cooperative Extension office. The agriculture or horticulture agent can help with taking the test and interpreting the results.
- Add the recommended soil amendments (fertilizer or compost) to the soil. Follow the labeled instructions on the fertilizer bag. If a soil test has not been taken, a general recommendation of 1 lb of 10-10-10 fertilizer and 2 lbs of agricultural lime for an area 3 feet by 16 feet should be sufficient. Use caution if you are having students apply fertilizer. Use gloves and wash hands thoroughly afterwards.

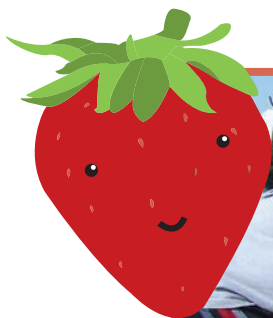


Figure 2: Strawberry Garden Location

The site should be sunny most of the day and be close to a water source and the classroom. This site is near the classroom, so children walk by it every day. The garden above was established without black plastic.

TIMELINE OF GARDEN TASKS

Early September

PREPARING THE GARDEN BEDS

- Begin to build the beds by loosening the soil with a rototiller or shovels and mix in lime, compost, and other soil amendments.
- Beds should be 3 feet wide and 6 to 8 inches high. If making more than one bed, place them at least 3 feet apart.
- Put soaker hose (or drip tape) down the middle of each bed on the surface of the soil. If the soil is dry moisten at least one day before planting (Fig. 3).
- Spread black plastic tightly over the bed. The tighter the plastic is, the better the soil will warm during the winter, allowing for more root and plant growth (Fig. 4).



Figure 3: Bed Formation

The beds are formed with rakes and shovels. The beds should be about 3 ft wide and 6-8 inches high. The length of the bed should be half the length of the number of plants. So a 15 ft bed will hold 30 plants. Yardsticks are used to measure soil depth and white tape is used to calculate length and width. A soaker hose was placed in the middle of the bed before the last few inches of soil were put in place.



Figure 4: Covering the Bed

Laying plastic on formed bed.

TIMELINE OF GARDEN TASKS

Early September Continued...

PREPARING THE GARDEN BEDS

- Anchor the plastic by burying the edges using wire staples or by rolling the excess plastic tightly around poles, pipes, or 2 x 4s. Rocks or bricks may also be used (Fig. 5).
- Fence the area if necessary to keep out deer, rabbits, and wandering students for as long as you think the unwanted visitors will be in the area (Fig. 6).



Figure 5: Securing the Bed

The edges of plastic are rolled up with long pieces of wood.



Figure 6: Protecting the Bed

Netting may keep out squirrels, deer, and other pests.

TIMELINE OF GARDEN TASKS



Early September Continued...

PLANTING

- Planting time will vary depending on where the garden is located. Gardens in western NC should be planted in early September. Gardens in the piedmont to the coastal plain can be planted from mid September to early October.
- Acquire the strawberry plants from a garden center, nursery, or grower. Plants grown in plug trays are the best. Use only strong, healthy plants (Fig. 7). Keep plants in a partially shaded place and water frequently if not able to set them out immediately.
- Measure and mark planting holes in the plastic (Fig. 8). The plants should be set in a staggered pattern, approximately 12 inches apart in rows that are 12 inches apart (Fig. 9). An easy way to mark is just to press a dimple into the plastic and cut a hole using a bulb planter.



Figure 7: Plug plants

A tray of plug plants obtained from a local farmer.



Figure 8: Punching the Holes

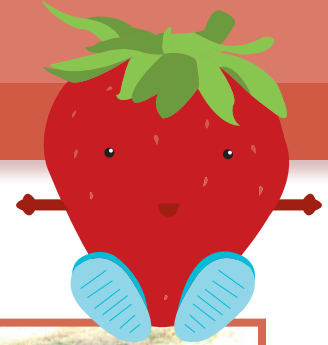
Punching holes with a bulb planter.



Figure 9: Finished Strawberry Bed

Plastic should be stretched as tightly as possible over the bed. Plant strawberries 12" between each plant and between rows.

TIMELINE OF GARDEN TASKS



Mid-September–October

PLANTING

- Water your plants in the trays thoroughly before planting. Using a bulb planter, narrow trowel, or any flat blade about 2 inches wide (Figs. 10 and 11), make holes that are about 4 inches deep in the soil below your cuts in the plastic. Press the plants into the holes, and pull the soil tight to them as best you can, so the soil is level with the crowns. The soil of the plug plants should be slightly below the soil in your strawberry bed. Water immediately after planting through the holes in the plastic with a sprinkling can, applying 4 to 8 ounces to each plant.
- Keep plants watered daily for the next week to make sure they become established and start growing (Fig. 11). The old leaves will eventually die and new ones will begin to form in about a week to 10 days. Avoid letting the plants wilt.



Figure 10: Setting the Plug Plants

Plug plants should be set just slightly below the soil surface and watered immediately after planting.



Figure 11: Watering the Plants

Keep plants watered daily for the next week to make sure they become established and start growing. Use a kitchen funnel to allow the water to directly reach the plants.

TIMELINE OF GARDEN TASKS



November–February

ESTABLISHING PLANTS

- Monitor soil moisture by probing the base of the plant. Water as needed.
- Cover plants with the row covers anytime weather forecasts predict temperatures below 15°F. Remove when temperatures are predicted to stay above 15°F for more than a couple of days (Fig. 12).
- Keep the row cover gathered alongside the bed so it can be pulled over the plants as needed.
- In late winter, pull off the dead leaves on plants. Be careful not to pull up plants or break off crowns.



Figure 12: Row Covers

Keep the row cover gathered alongside the bed so it can be pulled over the plants as needed.

February–March

EARLY PLANT GROWTH

- When plants begin to grow, start to fertilize by pouring liquid (Fig. 13) fertilizer through each hole. A 20-20-20 fertilizer works well. Follow the fertilizer label instructions to mix a solution that can be poured into the soil by the plants. Apply one cup per plant. Do this weekly from mid March to mid May. If you added compost, enough nutrients may be slowly released to the strawberries over time. Observe growth and decide if additional nutrients are needed.



Figure 13: Fertilizing the Plants

A funnel and a piece of plastic pipe is a good way to pour the liquid fertilizer in each hole.

March–April

BEGINNING TO FLOWER

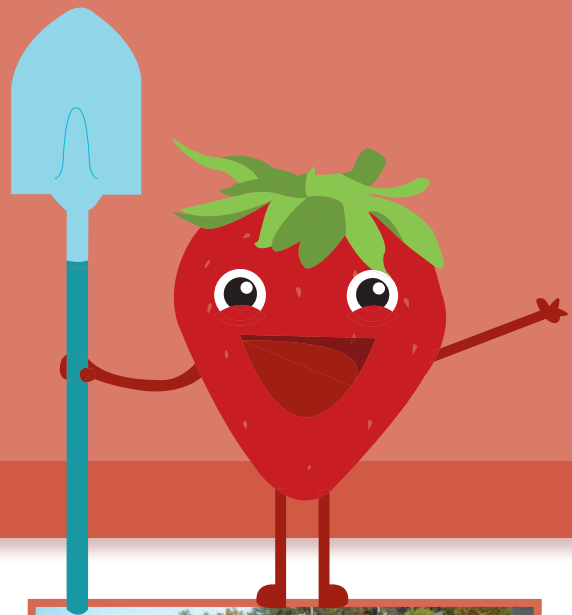
- Cover plants with the row cover anytime the weather forecast calls for temperatures below 32°F and flowers are present (Fig. 14). If temperatures are predicted to fall below 25°F, consider putting on a second row cover. You can also double-cover plants with clear plastic, old bedspreads, or sheets. Remove covers when the sun hits the plants and air temperature is above 32°F. Covers (but not clear plastic) can be left on for several days during a cold snap to hold in heat and reduce labor.
- Water plants as needed through your drip tape or soaker hose. Remember that rain cannot get through the plastic and plants will not get enough through the holes.



Figure 14: Strawberry Plant Flowers

Cover plants with the row cover anytime the weather forecast calls for temperatures below 32°F and flowers are present.

TIMELINE OF GARDEN TASKS



April–June

HARVEST TIME

- Keep plants well watered as the weather gets warmer. Water demand will increase as the plant grows. Do not let the bed dry out! By the same token, do not over-water. Probing with a finger to check soil moisture is a good method.
- Watch the strawberries change color and pick when the berries are ripe. Remove any fruit that is damaged, overripe, or moldy to reduce the spread of disease.

Mid–June

PLANT SUMMER COVER CROP

- At the end of harvest season, pull out strawberry plants and compost in a space away from the strawberry garden. This type of strawberry plant rarely performs well a second year.
- Gather up black plastic and throw away drip tape, but store the row cover and soaker hose for next year.
- Plant a cover crop like buckwheat or field peas that will die off and not leave a lot of residue that will get in the way for next year. Or cover with hay or decomposed leaf mulch that can be easily mulched back into the bed.
- You can reuse the location and soil, but each year you increase your chances of disease if using the same soil. Ideally, you should plan to move to a new site or bring in new soil.



Figure 15: Kids in the Garden

Empower students to do as many of the garden tasks as possible, they will enjoy the experience and sweet reward of strawberries.



Prepared by:

GINA FERNANDEZ

Professor/Extension Specialist
Department of Horticultural Science
NC State University

ELIZABETH DRISCOLL

4-H Youth Specialist
Departments of Crop Science, Entomology,
Horticulture and Soil Science
NC State University

DEBBY WECHSLER

Executive Secretary
NC Strawberry Association

MEGAN SEDAGHAT

Classroom Teacher
Swift Creek Elementary
Wake County Public School System



North Carolina Cooperative Extension gives our residents easy access to the resources and expertise of NC State University and NC A&T State University. Through educational programs, publications, and events, Cooperative Extension field faculty deliver unbiased, research-based information to North Carolina citizens. North Carolina Cooperative Extension is based at North Carolina's two land-grant institutions, NC State University and NC A&T State University, in all 100 counties and on the Cherokee Reservation.

To find your county office visit: <http://ces.ncsu.edu>.