

**Grade Level: 2**

**Title: What is the “Matter” with the Plastic?**

**Purpose:**

The purpose of this lesson is for students to develop an understanding of properties of solids and liquids and the changes they undergo.

**Subject Area(s) Addressed:**

Science and Math

**Common Core/Essential Standards:**

**Science:**

2.P.2 Matter: Properties and Change: Understand properties of solids and liquids and the changes they undergo.

**Math:**

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

**Vocabulary:**

black plastic	gas
Celsius	liquid
Fahrenheit	scale
fumigation	solid

**Materials Needed:**

black plastic  
clear plastic (and white plastic, if available)  
graph paper  
raised bed or a planter for observation  
thermometer

**Teaching Strategy:**

**Essential Question:**

Why do farmers cover the rows of strawberries with plastic?

As you begin your discussion of matter, have students define the three states of matter: solid, liquid, and gas. Have a picture a strawberry farm where the plastic is being laid. Ask, “Why do farmers cover rows of strawberries with plastic?” Have students predict the reasons. Have students write these reasons in their

science journal. Then have students predict what using plastic on soil has to do with the three states of matter. Have them describe the characteristics of plastic, using “Background Information” as a guide. Show students different colors of plastic, and have them predict which plastic would be better to use and why.

### **Activities:**

**Temperature:** Place soil into two planters, or if you have a raised bed, cover a portion with black plastic and leave a portion uncovered. Place a thermometer under the plastic and one on top of the uncovered soil. Have students compare the temperatures (it will take a while for accurate readings to be available). Have students write down the temperatures observed in Fahrenheit and Celsius. Have them explain their observations by completing a picture graph of the temperatures over time. Do the experiment again, this time using the different colors of plastic (black, clear, white). Before students take their readings, have them predict in their science journals which plastic will hold more heat. Have them write their observations in their journals and chart on their graphs. Either before or during this activity: Teach how to read a thermometer and discuss the meaning of the numbers, the tick marks, F and C.

**Evaporation:** Put equal quantities of moist soil into two clear plastic cups and weigh each one, adjusting amounts of soil so as to have equal weights. Do not pack down the soil. Cover one with black plastic and fasten it with a rubber band. Leave the other open. Put both cups in a warm sunny location for several days, until the soil in the uncovered cup is somewhat dried out. You should be able to see beads of moisture in the covered cup. Weigh the two cups and find the difference between the weights. Then, in another cup, weigh out an amount of water equal to the difference of the two weights; this is the amount of water that has been lost.

### **Background Information:**

Plasticulture, the practice of raising crops with a plastic film covering the ground (usually raised beds), has a number of benefits for the farmer. These include:

1. Retention of heat in the soil. This allows crops to start growing sooner in the spring and into the fall/winter. Strawberry plants on plastic continue to add roots during warm spells in the winter even when the leaves aren't visibly growing. The plastic also protects the roots from freezing and radiates some heat back, raising temperature at ground level. The retention of heat is very important for the NC strawberry system, allowing varieties that were adapted in warmer climates (Florida, coastal California) to grow here successfully.
2. Retention of moisture in the bed. The down side is that rain can't penetrate the plastic, so supplying water through drip irrigation tapes placed under the plastic is generally a necessity.
3. Retention of fumigants in the soil. Some growers fumigate their soil to control weeds and diseases. The fumigants are volatile gases that must be confined in the soil by the plastic. Fumigation is generally done at the same time as the

- plastic is put down, several weeks before planting. This gives the chemicals time to do the work and prevents toxic effects to farm workers. By planting time, fumigants have broken down or dissipated gradually, so it is safe for workers to punch holes in the plastic and set out plants.
4. Prevention of weeds. Strawberry farmers still need to control those weeds that come through the holes where plants are set and between beds. Hand-weeding, mowing, and some herbicides are used.

The black plastic that strawberry farmers use is very thin and flexible (a sample is available from a grower or the NC Strawberry Association). Some strawberry growers in California use clear plastic; growers who are trying to raise a summer/fall crop of berries sometimes use white plastic so the plants and fruit don't get so hot.

### **Extension Activity:**

Invite a strawberry farmer to the classroom to discuss the purpose of black plastic. Ask him/her to bring in examples of black plastic. Share with the farmer that any pictures s/he could bring would be very helpful.

### **Resources:**

For a small piece of white or black plastic, cut a piece from an ordinary household garbage bag. A sample of the black plastic that farmers use is available on request from the NC Strawberry Association ([info@ncstrawberry.com](mailto:info@ncstrawberry.com)).

### **Assessment:**

Use science journal and graph for formative assessment.

**North Carolina Strawberry Association – [www.ncstrawberry.com](http://www.ncstrawberry.com)**

*This project was supported by the North Carolina Department of Agriculture and Consumer Services Specialty Crop Block Grant Program.*

