



Cooking Up Agriculture

with STEM



Dressing Up Agriculture

Grade Level: 6—8

Objective: Promote STEM abilities and critical thinking skills, while educating about food production and agriculture.

Common Core: Mathematics: CCSS.Math.Practice.MP.1; MP.6; 7.RP.A.2; 8.F
English Language Arts: CCSS.ELA-Literacy.SL.6.1; SL.6.2; SL.6.5; RST.6-8.1; RST.6-8.3

Next Generation Science Standards: Engineering Design.MS-ETS1.B; MS-ETS1.C;

Suggested Reading Materials:

IAITC Nutrition Ag Mag

IAITC Corn Ag Mag

IAITC Soybeans Ag Mag

What is Scarcity of Resources? by Jessica Cohn | ISBN: 077874261X

What is Trade? by Carolyn Andrews | ISBN: 0778742636

What is Supply and Demand? by Paul Challen | ISBN: 0778744574



Materials Needed:

- Oils
- Vinegars
- Water
- Small cups for tasting
- Markers
- Labels
- Refrigerator
- Kitchen scale
- Computer access

Background:

Agriculture plays a crucial role not only in the United States, but right here in Illinois. Illinois’ top agricultural products are corn and soybeans. Corn and soybeans are processed into other foods that we eat every day.

Next time you enjoy a meal or a snack, ask yourself, “where’s the food; without the farmer?”

Many products consumed in Illinois come from the work of others in addition to the farmer.

Food scientists study characteristics, microbiology, and chemistry of the food we eat every day to improve and develop methods for preservation, quality control, nutrition, safety, sustainability, and convenience. These scientists work in teams who specialize in specific tasks. Thus, there are many career opportunities in food science. Even Disney and NASA employ food scientists! Check out the video “What Is Food Science & Technology?” to learn more. <http://www.ift.org/knowledge-center/learn-about-food-science/what-is-food-science.aspx>

Introduction:

- Explain the health benefits provided by salad greens.
- Explain how to select salad greens.
- Discuss cost and time effective strategies for incorporating salad greens into family meals.
- Discuss the preparation and storage techniques of salad greens, including cleaning, trimming, cooking, and storing.
- Ask students what comes to mind when they hear the word lettuce. Common responses may include: green, plain, dull, salad, etc.
- Ask students what is mixed with lettuce to make a salad.

Directions:

1. Bring in a grocery item such as a box of cereal. Ask students how the item transformed from an idea to a selection on our grocery store shelves.
2. Divide the students into teams. Each team member will specialize in a specific area such as marketing, food chemistry, graphic design, and cost analysis. (tasks labeled on next page) At the end of the assignment, teams will present their products to the class, and even eat their experiments!
3. The list of potential ingredients to choose from follows:
 Oils: (corn oil, soybean oil), Vinegars: (apple cider, red wine, balsamic), Water, Salt, Pepper, Sugar, Horseradish, Honey, Soy Sauce, Herbs, & Spices
 - a) With more than 950 food manufacturing companies, Illinois is well-equipped to turn the state's crops into food and industrial products. Try making your dressing using ingredients that can be produced in the state of Illinois.
4. Provide a class period for groups to research and design an outline. Before the end of the class, each team should turn in an outline for approval.
5. Prior to food preparation, be sure that all areas, utensils, and ingredients are washed properly. Be sure that perishable foods are refrigerated properly.

Taste Test Guidelines:

- Provide each member of your team with a sample of each variation of your salad dressing recipe. Samples can be placed in small paper cups that are labeled A, B, and C.
- Provide a score sheet, napkin, cup of water, and spoon for each member.
- Team members should not talk to one another during the taste test and should not be able to see how other team members are recording their scores.
- Ask each team member to test sample “A” by taking a small spoonful of the salad dressing and writing down their scores for taste, aroma, and appearance. Repeat this step for any other samples.
- After testing each sample, have team members take a drink of water to cleanse their palette and clean their spoon by rinsing it under tap water and drying it with a paper towel.

	Recipe A	Recipe B	Recipe C
Taste (1-5)			
Aroma (1-5)			
Appearance (1-5)			
Total Score			

Scoring Value:

- 1 = Not fit for consumption
- 2 = Poor
- 3 = Neutral
- 4 = Good
- 5 = Excellent

Lesson Extender:

- After the groups complete their product, the teams should create a skit using a multimedia method to present their product to the class.
- Conduct a taste-test party and include carrots and celery for students to sample each team’s creation.

Market Analyst:

- Define the target audience for your product. For example, will you be marketing to young children, teens, parents, or senior citizens? Be prepared to justify your choice.
- Do research to find out what qualities your target audience looks for in a salad dressing. Some examples may include: low calorie, lactose free, gluten free, nutritional value, or local ingredients to name a few.
- Determine a name, a slogan and an advertising campaign for the new product.
- Discuss how your target market interacts, views or thinks about agriculture. What might be the most influential factor in purchasing your dressing?

Graphic Design Artist:

- Create a label for the product that includes the product name, slogan, logo, ingredients, storage requirements, nutritional information, recommended serving size, and UPC bar code or QR code.
- Make sure to use mathematics to incorporate accurate information on your nutrition label.
- Include an attractive container and graphics for the appropriate target audience and explain why you created your design.

Food Chemist:

- Create a recipe for your product that includes ingredients, measurements, and procedure.
- Keep in mind that we have five senses. Your product should appeal to your market in taste, texture, smell, and appearance to be successful.
- Conduct taste tests amount group members to reach a consensus on the recipe. Keep notes on which ingredients go well with others and which do not. Make sure trials are recorded to ensure the recipe can be replicated.
- Research and determine the shelf life and storage requirements after opening the product.

Cost Analyst:

- Use a spreadsheet to determine the cost of the ingredients, packaging, and shipping.
- Determine the final cost per unit and add your selected margin of profit.

Ingredients list	Ounces of each ingredient per bottle of salad dressing	Cost per ounce	Cost of each ingredient per bottle of salad dressing

- How much does the jar or container that you are using to package your salad dressing cost?
- How much would it cost to mail a bottle of your salad dressing to the store where you plan to sell it?

Lip Balm

Grade Level: 5

Objective: Students will observe as beeswax, a solid, is melted to a liquid and combined with soybean oil. The mixture cools and turns to a solid. Students will also discuss the moisture-retaining properties of oil in relation to animals and plants.



Common Core: Mathematics: CCSS.Math.Practice.MP.4; MP.5; 5.MD.A.1; 5.MD.C.3

Next Generation Science Standards: Matter and Its Interactions.5-PS1-2; 5-PS1-3; 5-PS1-4

Suggested Reading Materials:

IAITC Soybeans Ag Mag

Soybean Terra Nova

Auntie Yang's Great Soybean Picnic by Ginnie Lo | ISBN: 1600604420

Materials Needed:

For each student:

- lip balm container

For class:

- 3.5 ounces (100g) beeswax
- stir stick
- beaker
- 1 bottle (3.7ml) of cooking flavoring oil (optional)
- 1-1/2 cups (360 ml) soybean oil
- hot plate
- hot pad

The above recipe will make enough to fill 30 containers about 1/2 full.

Directions:

The block of beeswax can be easily broken up into pieces by placing the block in a large freezer bag and have the students break it up with a hammer. Weigh 100g of the small pieces in a 600 ml beaker. Put the beaker with the beeswax on the hot plate. Turn on the hot plate before adding soybean oil so that students can see the wax begin to melt. With the hot plate on low, heat the mixture of beeswax and soybean oil, stirring occasionally. When the beeswax is completely melted, turn off the heat. If you choose to add flavoring, add the contents of the bottle (3.7ml) at this time and stir until everything is completely mixed. Ask the students why they think the beeswax and oil mixed. Explain that beeswax is an oily substance and, therefore, mixes with oil.

Pour the liquid into the lip balm containers, filling them about 1/2 full. Allow each student to take his/her container of lip balm and observe the changes as the liquid cools. What is happening as the liquid cools? (It is getting harder.) Now that the liquid is turning solid, where is the oil? (Mixed with the beeswax.) Discuss solids and liquids with the students.

When the lip balm has cooled, discuss its uses. We use lip balm to prevent chapping and to moisturize our lips. The oil and wax in the lip balm create a protective seal that prevents our lips from chapping (drying out).

Lesson Extender:

Students can form a "mini" manufacturing company for types of fundraisers. Conduct flavoring and cost analysis to find out how to make and sell their product. By listing ingredients such as soybean oil, beeswax, and other information identified on flavoring oils, students can generate labels for their jars or twist-up tubes.