Part 6: Herbicide Management Simulation

Introduction to Task

The decision to make an application of herbicides to a field is something that farmers continually weigh. It is critical for farmers to apply herbicides correctly because of environmental and economic costs. What makes that decision more difficult is the resistance of some plants to certain herbicides.

Herbicide resistance means that a direct application of the product to the plant does not always result in the death of the targeted plant. Keep in mind Lethal Dose experiments (LD50) when considering this idea. **Herbicide resistance** is a result of the chemical reaction that occurs at the site of action (SoA).

In this simulation student groups will determine the parameters of a farm operation by rolling dice and using the activity cards, provided by the teacher to make decisions about the proper spray nozzle to be used to apply an herbicide. Students will test their nozzle on the demonstration sprayer.

Step 1: Determining Farm Parameters

In this simulation you will use dice to represent parameters that exist on your fictional farm. Roll the dice for row 1 and 2 to determine the commodity and stage of growth.

Record in the column labeled **Result** in the table on the next page.

Step 2: Herbicide Selection

Row 3 identifies the concentration of the weeds on the field. Use the four-sided dice to determine the number of species that are on your field.

Record in the column labeled **Result** in the table on the next page.

Row 4 identifies the specific weed that is present. This is important because each herbicide has an active ingredient, which is a chemical that disrupts or inhibits the regular chemical reactions in the cell. Some species of plants are resistant to the active ingredient, which means that the weed is not affected by an application. The Soy Checkoff dollars have identified the *11 Biggest Threats* as it pertains to herbicide-resistance management.

If you have rolled a one for row 3, you only need to roll this once. If the value in row 3 is a four, you will have to roll four times. If you repeat the number, roll again. The number on the dice represents the number that is identified in the *Eleven that Threaten Booklet* – record these values in the table on the next page.

Your teacher will either provide you with cards to identify the specific plant, or you can access this at http://takeactiononweeds.com/farmer-kit-request/ and select "Eleven that Threaten" Guide.
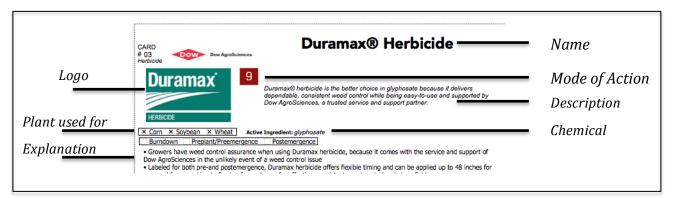
Table of Recorded Parameters of the Simulation

Parameter	Sides on dice	Value	Result
1. What commodity is in your field	6	1 or 4 Corn 2 or 5 Soybean 3 or 6 Wheat	
2. What stage are you at in your growth plan?	4	1 – Preplant 2 – Preplant incorporated 3 – Pre-emergence 4 – Post emergence	
3. How many weeds are in your field? Dominance of weeds based on the *11 that threaten*	4	Total number of nuisance species	
4. Which weeds are in your field? For Each of the values in the row above	12	• only values of 1-11 can be used • if you roll a 12 then • redo the roll • if you repeat the number, redo the roll	
5. Percentage of the field covered in the species, need to roll for each value of the row above	10	• Values represent percentage of 100 • 0 is equal to 100%	

Step 3: Area Impacted

The last roll of the dice in row 5 is the percentage of the field that is covered. Farmers have to decide if the application of herbicide is worth the cost of the herbicide. Many times this decision is based on the concentration in the field.

You will need to decide which herbicide you will be using on your field. Herbicides are classified in several different ways with the characteristics listed on the cards that you have received from your teacher. The below diagram explains the information on the card.

The card provides technical information on the herbicide. You need to make a choice on which herbicide that you will be using based on the parameters that have been identified for you.

1. List your parameters here:

   _____

   _____

   _____

   _____

   _____

   _____

2. Which herbicide have you chosen, and why?

   _____

   _____

   _____

   _____

   _____

   _____

Step 5: Nozzle Selection

Using the TeeJet cards, determine which sprayer nozzle will you be using? Some of the nozzles are very similar. Remember that the color represents particle size.

3. Which nozzle have you chosen?

    _____

    _____

    _____

4. What is the desired pattern you are trying to achieve and why do you want that pattern? Use a diagram to illustrate what you are attempting. Be sure to illustrate both a single nozzle pattern and multiple head pattern.

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

5. Why is this necessary for the application that you are conducting?

    _____

    _____

    _____

    _____

    _____

6. Explain the result of your trial?

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7. The agriculture industry has been under scrutiny by many people for the applications of pesticides and fertilizers to crops. After working through the content in these pages, identify and defend your position on the applications of these chemicals.

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