



### Lesson 3: Synergistic Effects

Synergistic effects are what happens when two or more items work together to produce an effect that would be greater than the effect of the individual item alone. Is using pesticides and biological controls together during a crop cycle better than using just one alone?

#### Doing the Science

1. Start the Crop Protection Simulation by clicking on the “Sim” tab.
2. Click on the “Warning” Box, and record the identified pest in Table 1 below, then record the preferred pesticide for the pest. Click on the clip board to close the clipboard.
3. Click on the “Choose Defense” button.
4. Choose the pesticide according to the preferred pesticide for the pest, and choose either “Liquid” or “Granular” application. Record the pesticide and application in Table 1. Choose a biological control as listed in Table 1.
5. Click on the red “Done” button to close the clipboard.
6. Click on the “Submit” button. You have now applied the pesticide and the biological control at planting.
7. Click on the “Choose Defense” button, and unclick the biological control and the pesticide, so no biological or pesticide controls are chosen. Click the red “Done” button to close the clipboard.
8. Click the “Submit” button. No biological controls or pesticides have been applied in the 1<sup>st</sup> Growth Cycle.
9. Repeat steps 7 and 8 for the remaining cycles.
10. Click on the “History” file cabinet. Record your data in Table 1 below. Each color represents a Cycle: Planting, Stage 1 Growth, Stage 2 Growth, and Preharvest.
11. Click the “Reset” button until the same pest listed in Table 1 appears.
12. Repeat steps 3 to 11, changing the biological controls as listed in Table 1 below. Be sure that you run your trials using the same pest listed in Table 1, and that the pesticide and biological control is only used at planting.

**Table 1.**

	Crop Field Size	Insect Population	Pesticide Detection	Crop Quality
<b>Pest:</b>				
<b>Pesticide (Liquid):</b> Wasp Parasitoid				
<b>Pesticide (Granular):</b> Wasp Parasitoid				
<b>Pesticide (Liquid):</b> Beauveria bassiana (fungus)				
<b>Pesticide (Granular):</b> Beauveria bassiana (fungus)				
<b>Pesticide (Liquid):</b> Ground Beetles				

<b>Pesticide (Granular): Ground Beetles</b>				
<b>Pesticide (Liquid): Spined Soldier Bug</b>				
<b>Pesticide (Granular): Spined Soldier Bug</b>				

### **Do You Understand?**

1. What is the most effective combination of pesticide and biological control to use at planting?
2. Did a synergistic effect occur? Explain your answer.