



## MESA DAY CONTEST RULES 2016 – 2017

### Model Science – Agroecology & Bio-Control

LEVEL: High School – All Grades

TYPE OF CONTEST: Individual / Team

COMPOSITION OF TEAMS: 1 – 2 students per team

NUMBER OF TEAMS: 3 teams per center

SPONSOR: Damian Parr, UC Santa Cruz, Center for Agroecology & Sustainable Food Systems

OVERVIEW: Students will construct an original poster display that illustrates and describes (1) the lifecycle of an insect pest of an important agricultural crop in the central coast region (2) how biological methods, derived from agroecological theory, can control that pest. Students will answer six pre-assigned questions using reading material provided in the MESA Day curriculum. Project must be the original work of the student(s). Judges can ask questions for verification.

#### MATERIALS:

Legal: Non-perishable materials with which to build the original model.

Illegal: Any substance that will splatter including peanut butter, jell-o, liquids, fruits or vegetables.

#### RULES:

1. The poster display must be the original work of the student(s). Judges may ask questions to verify authenticity of the display. Commercial may NOT be used. Violation of this rule and only this rule will result in disqualification.
2. The display should be clearly labeled with student name(s), school and center. *If the display and/or model is not clearly labeled with student name(s), school and center, a 4.0 point penalty will be deducted from the total score.*
3. The display and model should meet minimum and maximum size requirements. (See *JUDGING # 1a*)

4. The display should be freestanding.
5. The competitors will attempt to answer six pre-assigned questions, plus randomly selected unpublished tiebreaker questions. (See *JUDGING # 6 – 10*)

#### JUDGING:

*The competition will be judged in two components. Judges will receive the “Score Sheet for Model Science – Agroecology & Bio-Control” from the MESA Day Host Center.*

#### Component I: Poster display of Agroecology & Bio-Control

1. One point will be awarded for each of the following: (3 points maximum)
  - a. The model poster display, including the stand and all of its components fits into a space that is 3 feet high by 4 feet wide.
  - b. The poster display is freestanding at the time of judging.
  - c. The display is clearly labeled (hand-drawn or student’s original computer-generated diagram) and all images, photos, figures, and diagrams of published materials are cited and referenced in the poster.
2. One point will be awarded for each of the 13 required elements of the poster display. Required elements listed below. Note: photos, figures, images, and diagrams may include multiple elements at the same time. It is unnecessary to have a separate image for each element. Example: Life cycle of pest and beneficial may have overlap in the same image.
  - Crop common name and scientific name (for example: Broccoli and *Brassica oleracea*)
  - Description of the crop, its productive characteristics and economic importance to the region
  - Crop image at the individual plant level
  - Crop image at the field production level
  - Crop image at harvestable maturity
  - Crop image at maturation level when susceptible to selected pest
  - Insect pest common name and scientific name (for example: Diamondback Moth and *Plutella xylostella*)
  - Description of the insect pest, it's geographic range, severity of damages/loss to selected crop in region, biological lifecycle, physiological mechanism for damaging selected crop
  - Insect pest image at the individual insect level at each phase of the insect’s maturation
  - Insect pest damage to selected crop image

- Beneficial insect or natural enemy image at the individual organism level, at each phase of the organism's maturation (if available)
  - Beneficial insect/natural enemy organism image where it is damaging/controlling the crop pest (if available)
  - Description of the beneficial insect/natural enemy organism including biological lifecycle and physiological mechanism for controlling selected crop pest. Include examples and case studies of success, if available
3. Bonus points may be awarded for up to 4 additional elements other than the required elements listed in *JUDGING # 2*. These extra elements must be correctly placed and labeled on the poster (1 point per additional element, 4 points maximum)
  4. Points will be awarded for composition. Do the poster and various elements display characteristics of originality and creativity in terms of overall composition? Are the different elements variable with different colors and dimensions? Is the use of materials used to depict the different elements creative? (4 points maximum)

#### Component II: Understanding the ecology of crop-pest-beneficial insect dynamics

1. Students will answer the following six questions based in part on information provided in the MESA Day curriculum. (12 points maximum)
2. Each correct answer will be awarded up to 2 points. Partial points may be awarded for partial answers.
3. There will be a set of 5 previously unpublished tiebreaker questions available on the day of the competition. Each tiebreaker question will be worth up to 2 points each. (10 points maximum, depending on number of tiebreaker questions used)

#### AWARDS:

Awards will be given for 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> place.

#### Specification Checklist for Students

2016 – 2017 MESA Day Rules were used.

- The poster display is clearly labeled with student name(s), school and center.
- The poster display fits into a space that is 3 feet x 4 feet.
- The poster display is clearly labeled w/ required components.

## QUESTIONS:

**Students MUST be prepared to answer each question with a complete sentence or sentences. Students MUST address the question generally, and specifically in context of their project.**

1. What are the benefits and disadvantages of chemical control?
2. What are the benefits and disadvantages of biological control?
3. What do you need to know about a pest to implement effective biological control?
4. What types of food or habitat resources does your beneficial insect need in order to be most successful at limiting the damage of the pest on the crop?
5. How could growers best facilitate biological control?
6. In order to improve biological control in your system, what type of research questions and hypotheses would you propose?

## RESOURCES

Students and instructors can use the following resources to create these posters:

### UC IPM

(<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74140.html>)

Provides an introductory overview of biological control.

### UC IPM

<http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html>

Provides a crop index that allows students to focus on insect communities (pest & beneficial) specific to individual crops (e.g. strawberry).

### Chapter: Arthropod Pest Management (plus PPT)

Provides 1) basic introduction to entomology, 2) an examination of how various farming practices affect biological control (e.g. Insecticide applications), 3) how to use IPM to promote biological control (e.g. economic thresholds) and 4) a resource list for further reading.

### Activity Guide

Provides relevant (and illustrated) applications for sustainable farming, IPM and biological control.

### Google Scholar

<https://scholar.google.com/>

Provides opportunities for in-depth explorations of biological control interactions using peer-reviewed scientific literature.

## Score Sheet for Model Science - Agroecology & Bio-Control

Team: School: Center/State:
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### Component I: Poster display of Agroecology & Bio-Control

<b>1. One point will be awarded for each of the following: (3 points maximum)</b>	
a. The model poster display, including the stand and all of its components fits into a space that is 3 feet high by 4 feet wide.	
b. The poster display is freestanding at the time of judging.	
c. The display is clearly labeled (hand-drawn or student's original computer-generated diagram) and all images, photos, figures, and diagrams of published materials are cited and referenced in the poster.	
Subtotal	

<b>2. One point will be awarded for each of the 13 required elements of the poster display. (13 points maximum)</b>	
<i>Required elements listed below. Note: photos, figures, images, and diagrams may include multiple elements at the same time. It is unnecessary to have a separate image for each element. Example: Life cycle of pest and beneficial may have overlap in the same image.</i>	
• Crop common name and scientific name (for example: Broccoli and <i>Brassica oleracea</i> )	
• Description of the crop, its productive characteristics and economic importance to the region	
• Crop image at the individual plant level	
• Crop image at the field production level	
• Crop image at harvestable maturity	
• Crop image at maturation level when susceptible to selected pest	
• Insect pest common name and scientific name (for example: Diamondback Moth and <i>Plutella xylostella</i> )	
• Description of the insect pest, its geographic range, severity of damages/loss to selected crop in region, biological lifecycle, physiological mechanism for damaging selected crop	
• Insect pest image at the individual insect level at each phase of the insect's maturation	
• Insect pest damage to selected crop image	
• Beneficial insect or natural enemy image at the individual organism level, at each phase of the organisms maturation	
• Beneficial insect/natural enemy organism image where it is damaging/controlling the crop pest	
• Description of the beneficial insect/natural enemy organism, its geographic range, estimated benefit to selected crop in region, biological lifecycle, physiological mechanism for controlling selected crop pest	
Subtotal	

<i>3. Bonus points may be awarded for up to 4 additional elements other than the required elements listed in JUDGING # 2. (1 point per additional element, 4 points maximum)</i>		
These extra elements must be correctly placed and labeled on the poster		
a. Additional element		
b. Additional element		
c. Additional element		
d. Additional element		
Subtotal		

<i>4. Points will be awarded for composition. (4 points maximum)</i>		
a. Do the poster and various elements display characteristics of originality and creativity in terms of overall composition?		
b. Are the different elements variable with different colors and dimensions?		
c. Is the use of materials used to depict the different elements creative?		
d. Additional creativity		
Subtotal		

**Component II: Understanding the ecology of crop-pest-beneficial insect dynamics**

<i>6. Students will answer six questions from an assigned list based on information provided in the MESA Day curriculum. (12 points maximum each correct answer will be awarded up to 2 points. Partial points may be awarded for partial answers.)</i>		
a. Question		
b. Question		
c. Question		
d. Question		
e. Question		
f. Question		
Subtotal		

<i>10. Tiebreaker Questions: There will be a set of 5 previously unpublished tiebreaker questions available on the day of the competition. Each tiebreaker question will be worth up to 2 points each. (10 points maximum, depending on number of tiebreaker questions used)</i>		
a. Question		
b. Question		
c. Question		
d. Question		
e. Question		
Subtotal		
DISPLAY Total		