

Possible Mini-poster headings used for high school level research or performance assessment. Text is adapted from:

A Handbook of Biological Investigation. Harrison W. Ambrose III and Katharine Peckham Ambrose. 1995. Hunter Textbooks.

TITLE and AUTHORS

The title should describe the work to the reader. Include the variables that are manipulated and the author(s)

ABSTRACT

The abstract is a one or two paragraph condensation of the entire article giving the main features and results of the work described more completely in the poster.

INTRODUCTION

The introduction has three parts: 1) The question asked, 2) Background context—where does this question fit with what is known, and 3) Your hypothesis presented in an “If...then” prediction that structures your research.

QUESTIONS:

BACKGROUND:

HYPOTHESIS:

METHODOLOGY

This section should include three sections in sufficient detail so that others can repeat your research.

PROCEDURE:

MATERIALS:

STATISTICAL TESTS:

RESULTS

Describe the results clearly. Use graphs, tables and charts to help clarify the results. Include a discussion on the statistics you use to describe or test your data. Save any conclusions for the DISCUSSION

DISCUSSION

What do your results mean when you consider the original question or hypothesis? Point out the significance of your results. If the results are unexpected or contradictory, you should attempt to explain why and point out possible avenues for further research.

LITERATURE CITED

Include all published works mentioned in your presentation. List in bibliographic form.

Lab Test Rubric

(modified from a rubric used by the Olathe East High School Science Department, Olathe, KS; which was modified from a rubric used by the Colorado Springs School district's science dept.)

Standards: The levels at which students are expected to perform the task

Score	Advanced (5)	Proficient (3)	Needs Improvement (1)
_____	Question Question is narrowly focused and suggests how an answer might be investigated. It is answerable.	Question is answerable but not narrowly focused.	Question is too broad and not practically investigated.
_____	Identification of Variables Correctly identifies specific, measurable independent and dependent variables.	Identifies variable being tested & variable being measured.	Variables and constants significantly incomplete &/or inaccurate.
_____	Hypothesis Hypothesis is testable and clearly stated in "If... then..." format. Specifically predicts relationship between dependent and independent variables.	Hypothesis is clearly stated. It predicts the influence of one variable on another.	Hypothesis is poorly stated and doesn't directly mention the variables.
_____	Materials Complete, detailed list of materials (size, conc., quantity) presented in vertical list format.	Most materials are listed and appropriate.	Materials quite incomplete or inappropriate for experiment.
_____	Procedure - Accurately tests the hypothesis - Conducts or analyzes at least 3 trials. - Procedure is in vertical list format, accurate, complete, easy-to-follow, and reproducible by another person. Includes diagrams to clarify procedures. - Includes all appropriate safety concerns.	Attempts to test hypothesis	Does not address hypothesis.
_____		Multiple trials attempted or need is recognized.	Single trial, poor understanding of use of multiple trials.
_____		Step-by-step procedure, generally complete. Minor errors/omissions make it difficult to follow or not always repeatable.	Procedure difficult to follow. Major omissions or errors.
_____		Includes critical safety concerns.	Safety concerns trivial or inadequately addressed.
_____	Data Collection & Presentation - Data table contains accurate, precise raw data & summary data reported in correct SI units with descriptive title. - Data summarized in well-organized, easy-to-read graph &/or figures. Descriptive title, appropriate labeling, keys, etc. - Data summarized in a clear, concise, logical manner. Patterns identified & described, but no conclusions drawn.	Data table with accurate data, most units labeled or implied. Minor errors. Title absent or trivial.	Data table inaccurate, confusing, and/or incomplete. Missing units.
_____		Data displayed in well organized easy to read graph &/or figures. Descriptive title, minor errors in use of units and labeling.	Graph/figures presented in a confusing and/or sloppy fashion.
_____		Reasonable, but somewhat unclear summary of data. Patterns in data not clearly identified.	Summary is unclear and illogical. Patterns in data not identified.
_____	Conclusion - Scientifically valid, logical conclusion, well supported by the data collected. Clearly addresses problem and stated hypothesis. - Sources of error identified and explained. Appropriate recommendations made to eliminate errors. - Student generates specific questions for future study.	Scientifically valid, logical conclusion, supported by data collected. Attempts to address problem and stated hypothesis.	Conclusion is incomplete or illogical. Does not address the problem and hypothesis.
_____		Sources of error identified.	Weak/trivial attempt to identify sources of error.
_____		Student makes attempt to generate questions for future study.	Student makes incomplete or inappropriate attempt to extend or apply knowledge.

INTRODUCTION

The introduction has three parts: 1) The question asked, 2) Background context—where does this question fit with what is known, and 3) Your hypothesis presented in an “If...then” prediction that structures your research.

QUESTIONS:

BACKGROUND:

HYPOTHESIS:

Will a population of <i>FastPlants</i> respond to artificial selection pressure for “plant hairiness”?		If hairiness in <i>Fast Plants</i> responds to selection then a population of plants with radical selection for hairiness should produce offspring with a greater mean hairiness.
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METHODOLOGY

This section should include three sections in sufficient detail so that others can repeat your research.

PROCEDURE:

MATERIALS:

STATISTICAL TESTS:

1. Students grow 150 1 st generation plants. 2. At day 8-10 students count the trichomes on the first true leaf petiole of each plant. 3. The 15 plants with the highest trichome count are selected for the next generation and pollinated at day 14. 4. Plants are grown, seed harvested and planted for second generation. 5. Second generation plants are scored for trichome counts on day 8-10.	Fast Plant Growing System Fast Plants	Only descriptive statistics were applied.
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Artificial Selection in Fast Plants

Brad Williamson

TITLE and AUTHORS

The title should describe the work to the reader. Include the variables that are manipulated and the author(s)

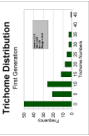
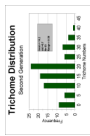
ABSTRACT

The abstract is a one or two paragraph condensation of the entire article giving the main features and results of the work described more completely in the poster.

High school students investigate artificial selection in *FastPlants* by selecting for trichome (plant hairs) numbers on the first true leaf's petiole. The investigation is reliable and doable by high school students and serves as a valuable tool for introducing natural selection.

RESULTS

Describe the results clearly. Use graphs, tables and charts to help clarify the results. Include a discussion on the statistics you use to describe or test your data. Save any conclusions for the DISCUSSION

Each student was responsible for scoring 5-10 plants per generation. Students were able to accurately determine the trichome count per plant. Student teams took turns maintaining the selected parent generation plants. The first generation of <i>FastPlants</i> demonstrates a skewed distribution for hairiness with most plants having 0-5 hairs on the first true leaf petiole. The second-generation distribution appears to have shifted to the right and is more normal. The mean of the second generation is more than a standard deviation from the first generation mean.	 
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DISCUSSION

What do your results mean when you consider the original question or hypothesis? Point out the significance of your results. If the results are unexpected or contradictory, you should attempt to explain why and point out possible avenues for further research.

By only pollinating only the first generation fast plants in the top 10% for harness the students imposed a radical selection event on the population. Offspring (second generation) from these parent plants demonstrated a clear shift in the mean for hairiness (14.2 hairs) compared to the entire first generation mean for hairiness (7.13 hairs). Interestingly the 10% of the 1st generation selected as parents had a mean of 25.5 hairs per plant. Further selection over several generations would indicate the range of selection possible with this plant.

This investigation is works very well to introduce students to the role of inheritance to selection and provides an excellent background for developing an understanding of the mechanisms of natural selection.

LITERATURE CITED

Include all published works mentioned in your presentation. List in bibliographic form.

Bruce A. Fall, Steve Fifield, and Mark Decker, Evolution By Artificial Selection: A 9-Week Classroom Investigation using Rapid-cycling. University of Minnesota, Minneapolis, MN 55455
<http://genbiol.cbs.umn.edu/activities/WFP/WFPposter.html>

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