

Wisconsin NatureMapping Asian Beetle Study

Developed by:

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High School Lesson Plan

Subject/Content Area:

Biology, Ecology and Mathematics

Target Audience:

This project is designed for general biology students. Students will be responsible for collecting data outside the school day. However, the data can be collected in urban, suburban, or rural environments. Students need access to the Internet (Nature Mapping) and spreadsheet software.

Project Goals:

Students will be able to collect and analyze data to answer a question about the distribution and preferences of Asian Lady Beetles.

Learner Outcomes:

The students will be able to

- Use a designed protocol to collect numerical data.
- Understand the importance of standards for data collection and the importance of following those standards.
- Keep detailed records of data and observations.
- Enter data using a standard format.
- Extract data from a database for analysis.
- Use an appropriate statistical tool (t-test) to test for the difference between means.
- Graph the results of a research project.
- Interpret the results of statistical analysis.

Alignment with Wisconsin State Standards:

This project demonstrates some elements of Wisconsin's Model Academic Standards in Science as well as Mathematics.

Science: A.12.7, B.12.5, C.12.1, C.12.2, C.12.3, C.12.4, C.12.5, C.12.6, F.12.7, F.12.8, G.12.5, H.12.6, H.12.7

Mathematics: A.12.1, A.12.5, B.12.5, D.12.3, E.12.1, E.12.2, E.12.3, E.12.5

Procedure:

- NOTE: This particular study is best suited to late October in Wisconsin. The study should be conducted when large numbers of Asian Lady Beetles congregate on houses, etc. during sunny days.
- Pose the following question to students: Why are there more Asian Lady Beetles on certain surfaces than on others?
- Allow the students to generate possible answers (in small groups, if desired) based on students previous observations.
- Discuss the possible answers as a class. Select one answer and help the students refine that answer into a hypothesis. (If students have trouble with this section, often forcing the idea into an “if/then” statement is helpful.)
- Introduce students to the data input form and data collection protocols for the Asian Lady Beetle project.
- Determine how many samples (quadrats) should be collected by each student.
- Either have a field data sheet prepared or have the students design a data collection sheet. Please remember to include all the data fields from the data input form. This allows comparison of data on a state-wide basis.
- Students should collect their data on the same day, during the same time “window”, if possible. For example, tell the students “Your samples should be collected between 4 and 6 p.m. tonight.”
- Students should enter their data into the Asian Lady Beetle Study on the Nature Mapping Website.
- Once all student data is in the database, use an Analysis of Variance (ANOVA) or other appropriate method of data analysis (please see the “Data Analysis Methods” link). Students will probably need help selecting and applying the appropriate method.
- Once the data have been analyzed, students should use the information to prepared a report which will use the data to accept or reject the hypothesis. Emphasis should be placed on using data to support the conclusion.

Assessment of Students:

Students will be assessed on their written summary of the research. The summary should be written as a miniature research paper. It is up to the teacher how thorough the paper should be; but, a suggested format would be: appropriate title, statement of the problem, background research, hypothesis, materials, procedure, data (in table format), analysis (including graphs and the ANOVA results), conclusion, and suggestions for improvement. A standard lab report rubric can be used to evaluate student work.

A nice addition following the research would be for students to present their findings to interested community members. Due to the fact that Asian Lady Beetles become a nuisance, there should be some inherent interest in the community.

A follow-up assessment could consist of presenting students with a similar data set. The students would be responsible for analyzing and interpreting the data.