Service Learning and Plant Protection in Graduate Education: Reaching the Next Generation

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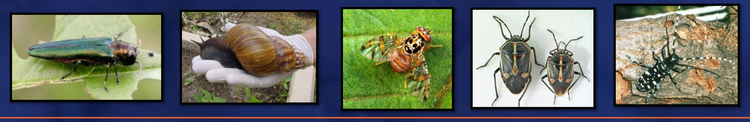
Introduction

Invasive species have a global impact by causing economic losses, decreased biodiversity, human health hazards, and disruption of native ecosystems. In the U.S., it is estimated invasive species cause losses at $13 billion annually. In Florida, over $4 billion worth of agricultural commodities for export were produced in 2014. Florida is one of the first places for invasive species in the U.S. due to travel, major ports, and importation of cut plant materials. Consequently, the potential impact of invasive species to Florida's agriculture is significant. Despite the importance of invasive species and agriculture, the general public, and especially the American youth, remain uniformed.

Some of the recent pest or pathogen problems that have or could potentially impact Florida include: Mediterranean fruit fly, *Ceratitis capitata*; Oriental fruit fly, *Bactrocera orientalis*; light brown apple moth, *Ephiphyas postvittana*; European pepper moth, *Duponchilia fovealis*; spotted-wing drosophila, *Drosophila suzukii*; citrus greening, *Candidatus* Liberibacter asiaticus; giant African land snail, *Achatina fulica*; sudden oak death, *Phytophtora ramorum*; Bagrada bug, *Bagrada hilaris*; emerald ash borer, *Agrilus planipennis*; Asian long-horned beetle, *Anoplophora glabripennis*; and the old world bollworm, *Helicoverpa armigera*.



Project Goals

1. Raise awareness of invasive species, promote early detection of exotic pests and pathogens, and encourage sample submission in middle and high school aged students.
2. Evaluate current knowledge of Florida's youth on invasive species and plant biosecurity and determine the effectiveness of the developed program in educating students.

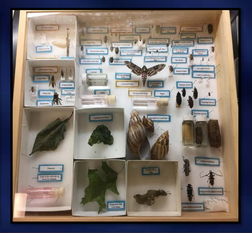
Methods

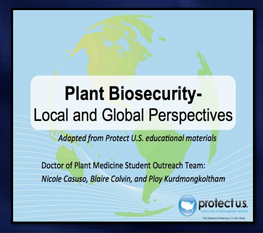
Audience

The target audience is middle school and high school aged students throughout Florida. Schools were selected based on the presence of biology, agriculture, or natural science classed. Teachers were contacted via email and programs were scheduled with interested instructors. Teachers selected one of two topics to be presented to their students: Plant Biosecurity- Local and Global Perspectives or Invasive Species that Affect Plants. Twenty six classes were selected throughout Florida for the 2017-2018 school year.

Presentations

The PowerPoint presentations were modified from currently existing Protect U.S. scripted lectures to fit the target audience. Interactive materials were also provided including live, caged agricultural pests, preserved insects, damaged or infested plants, and thought provoking discussion questions. Each student was given a magnifying hand lens, and Protect U.S. pen and notepad. Candy was used as incentive for students to ask and answer questions throughout the presentation.





Consent

All surveying was approved by the University of Florida, Institutional Review Board. As part of the evaluation process, all students were given an informed consent document to take home. For students under 18 years of age, their parent or legal guardian was required to sign the document and return the signed form to their teacher prior to the presentation. If students were over 18, they could sign the paper and give consent themselves. Informed consent forms were all collected and retained prior to giving the survey to students.

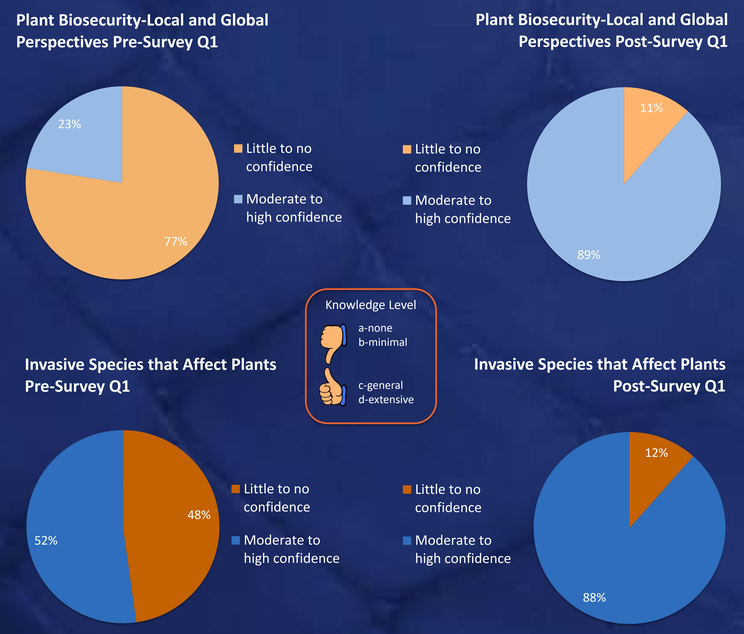
Surveys

Surveys were designed similarly for both topics. The first question asked students to rate their confidence level with the topic. There was no correct answer for Q1. The remaining six questions were directly based on content presented in the lecture. Q2-Q7 had correct answers.

All surveys were numbered with a specific class code. Each student had a survey number so that pre- and post-surveys could be paired upon collection. Packets were given to the students at the beginning of class and the pre-survey was completed prior to the lecture and collected. At the end of the interactive presentation, students completed the post-survey. Between the two topics, a total of 936 students were surveyed and over 1,000 students reached through the program in the 2017-18 school year.

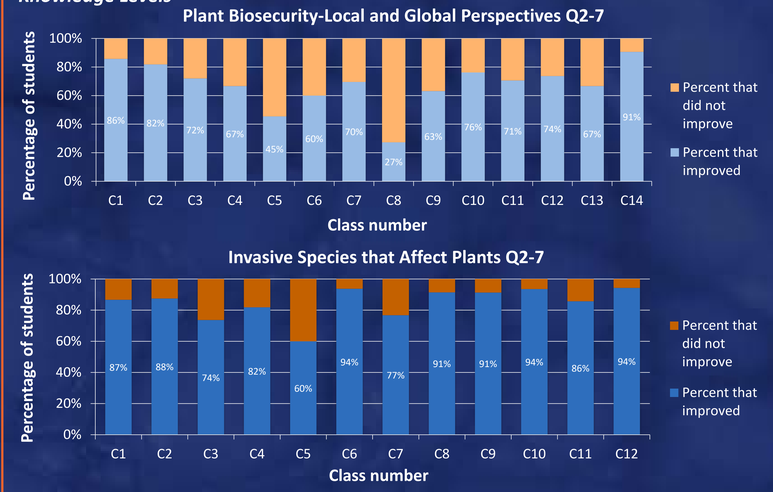
Results and Discussion

Confidence Levels



The students initially were not confident in their familiarity with the two topics. In the pre-survey, students were less confident about plant biosecurity than invasive species. Furthermore, the confidence level increased in both subjects following the outreach program. However, there was a more dramatic increase in confidence level in the plant biosecurity topic with initially only 23% of students having moderate to high confidence and increasing to 89%. In the invasive species topic, 52% of students had moderate to high confidence and this increased to 88% following the program.

Knowledge Levels



Classes were analyzed to look at improvement from pre- to post-survey. Improvement was considered an increase in score on the posttest from the pretest which was paired for each student. In both topics, the average improvement was above 45% in all classes. In the plant biosecurity, topic the average improvement was 68% of all students; however, two individual classes in the plant biosecurity topic showed less than 50% improvement bringing the average down. This is likely due to unplanned events that occurred in these classes such as a fire drill in C8. In the invasive species topic, the average improvement was 85% with the lowest percentage being around 60%. Overall, there appears to be much higher improvement in the invasive species topic than the plant biosecurity topic.

Future Implications

In the future, this program will continue at more middle and high schools throughout Florida. A website is currently under development to help facilitate communications with teachers and students. The website can be found the link at the bottom. Based on survey results, presentations will be modified to enhance learning and retention by students. Furthermore, survey methods will continued to be improved.

http://dpm.ifas.ufl.edu/outreach/

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