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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 uninformed.

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, *Ephiphys postvittana*; European pepper moth, *Duponchilla fovealis*; spotted-wing drosophila, *Drosophila suzukii*; citrus greening, *Candidatus Liberibacter asiaticus*; giant African land snail, *Achatina fulica*; sudden oak death, *Phytophthora 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 classes. 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. Fifteen classes were selected throughout Florida.

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

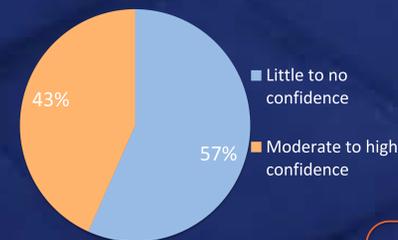
Surveys were designed similarly for both topics. The first question asked students to rate their confidence level with the topic. There was no correct answer for Q1. The remaining six questions were directly based on content presented in the lecture. Q2-Q7 had correct answers.

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.

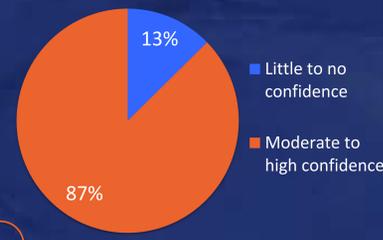
Results and Discussion

Confidence Levels

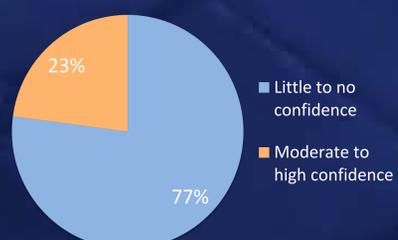
Invasive Species that Affect Plants Pre-Survey Q1



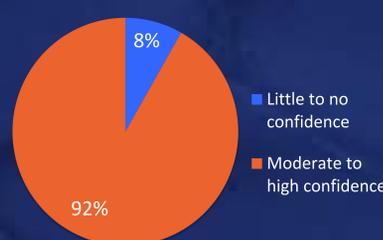
Invasive Species that Affect Plants Post-Survey Q1



Plant Biosecurity-Local and Global Perspectives Pre-Survey Q1



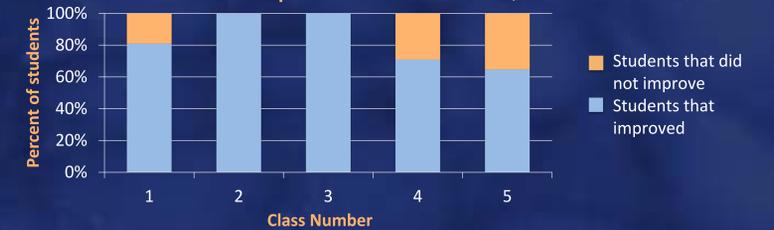
Plant-Biosecurity-Local and Global Perspectives Post-Survey Q1



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.

Knowledge Levels

Invasive Species that Affect Plants Q2-7



Plant Biosecurity-Local and Global Perspectives Q2-7



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 all classes except those at the first two outreach events. The paired method was employed following the surveys at those two high schools. In both topics, the average improvement was above 50%. However, two individual classes showed less than 50% improvement. 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 continue to be improved.

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

Selected References

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