An Experiential Approach to the Study of Weed Ecology and its Relevance to Teaching IPM Principles

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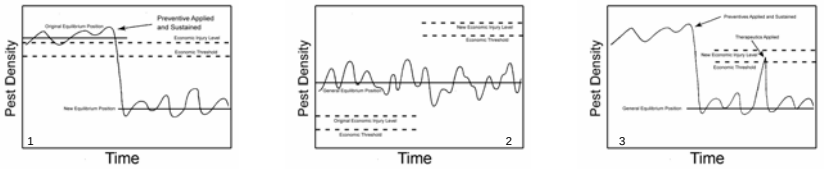
Introduction This poster describes an active learning-based approach to resident education and outreach education that is widely applicable to those conveying principles of integrated pest management (IPM) to diverse audiences. Three examples of experiential learning activities are presented that we have used to teach weed ecology and management. The activities were (1) a two-day weed ecology workshop at The University of the West Indies-Mona Campus in collaboration with The Caribbean Agricultural Research and Development Institute (CARDI) (2) a weed germination periodicity (GP) demonstration used for undergraduate resident education and (3) a series of outreach education field days based on the concept of ecologically based weed management (EBWM). Learning outcomes were effectively realized with these approaches and there are many logical extensions of this active learning approach to teaching other weed management and IPM principles.

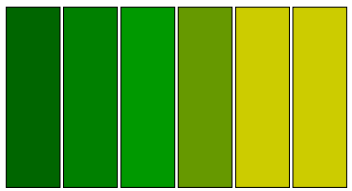


Guiding Integrated Pest Management Principles Larry Pedigo proposed these three principles for insect pest management at the Second National IPM Symposium in 1994 (Mortensen 1997). We use these principles to shape our thinking when developing weed ecology and management educational activities. Briefly, the first IPM principle aims to **lower the pest's general equilibrium density**. The goal of the second principle is to **raise the density of the pest at which economic damage occurs**. And finally, the third principle states that when pest populations increase significantly management action should be taken to **truncate population peaks**. These important themes emerge in all of the experiential learning activities discussed here.

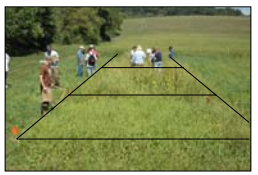
Weed Germination Periodicity Demonstration

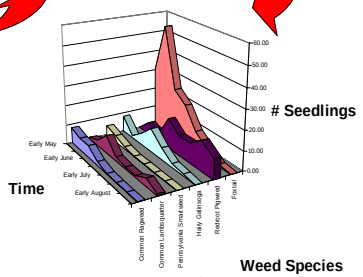
The objective of this activity was to successfully implement an active learning exercise centered around teaching the concept of weed species GP and related factors that ultimately influence the emerged weed flora present in producers' fields as well as to improve the students' plant identification and field sampling skills.

Study Design:
•Select a site known to have a diverse weed seedbank (preferably uniformly distributed)
•Beginning in the spring, aggressive tillage (rototiller) is performed in a plot every 2-3 weeks
•Plots are used for the learning activity some time during or after July



Variations on the treatments are easily added. For example, a till and no-till treatment, or daylight and night time tillage treatment could be implemented at each date.





Fall 2005 Student Survey of the Germination Periodicity Lab Exercise

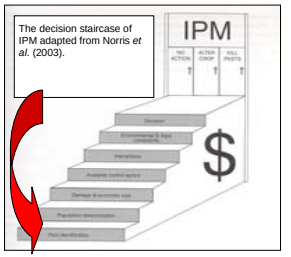
Statement	Mean
This was a valuable activity.	1.64
This activity improved my understanding of weed germination periodicity.	1.50
This activity improved my ability to identify weed species.	2.14
This activity improved my knowledge of survey methods.	2.21
The field experience was more effective than lecturing on the same subject in the classroom.	1.64
This activity increased my knowledge of cultural field crop weed management.	1.64
This activity improved my ability to work with others.	3.00
This activity improved my ability to analyze and interpret data.	2.71
This activity improved my writing skills.	3.57

N=14, Responses to each statement were rated on a scale of 1 to 5: 1=strongly, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree.

Methods and Results Students collected emergence periodicity data and presented and linked results to implications for weed management in class. Over the past 15 years we have used variations of this experiential activity a number of times with students, farmers and agricultural practitioners and each time the resulting discussions have been stimulating and learning outcomes and their implications for management realized. This activity has routinely been evaluated highly for content and new knowledge gained.

Weed Ecology Workshop with CARDI in Kingston, Jamaica

The learning objective of one session of this workshop was to underscore the importance of pest identification as the foundational step in development of an IPM plan. In this case, the specific goals were to understand the taxonomic differences between broadleaf plants and grasses, learn how to use a weed identification key in the field (for ~15 weeds) and to discuss the purpose and construction of a herbarium.

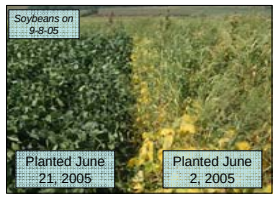


The decision staircase of IPM adapted from Norris *et al.* (2003).

Results Through our interaction with local experts Dr. Jane Cohen and PhD candidate Nickeisha Reid of The University of the West Indies, who facilitated the use of local weed species and material for the workshop, the experiential nature of the weed identification exercises proved to be valuable for all the workshop participants-including the instructors! Though it may seem like an obvious consideration, the importance of having relevant material and topics for the target audience can not be overstated when developing experiential learning activities when a change in management decision making behavior is the primary educational objective.

EBWM Field Days

During the 2005 field season a series of outreach education field days for agricultural professionals were developed around the concept of ecologically based weed management. Experiential activities directly related to IPM principles 1-3 above were developed on the following themes: effects of cover crop use and cover crop type on weed suppression, effect of timing of soil disturbance on weed suppression and periodicity in weed emergence and the role of weed seed predation in in conventional and organic cropping systems.



Methods and Results Participants completed day-long field tours and engaged in lively, free flowing discussion based on the research that they had seen. Survey results indicated that learning objectives were met for all research topics with those surveyed indicating significantly more understanding of the topics after the activities than before the event took place.

Implications We have found that the value of experiential learning in effective communication of important weed ecology principles shapes the way we design our educational activities. By applying active learning techniques (based on guiding IPM principles) like those described here to a variety of compelling research questions learning outcomes and their implications for IPM have been realized. From the instructor's perspective, activities like these only serve to reinforce our commitment to and development of inquiry-based learning strategies.

References
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Norris, R. F., E. P. Caswell-Chen, M. Kogan. 2003. *Concepts in Integrated Pest Management.* Prentice Hall, New Jersey.

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