http://www.life.umd.edu/grad/mlfsc/

Don't Bug Me
An Integrated Pest management Activity

by

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Don't Bug Me - A Teaching Unit on Integrated Pest Management

Objectives

- assess prior knowledge of students
- provide introduction to IPM and terms used in IPM
- insure adequate sample size and unbiased sampling
- identification of pests around the school
- develop a school IPM plan

Teacher Planning Guide (***hyperlinks will connect you to each activity)***

Assess Prior Knowledge

Activity 1 - Carousel Brainstorm (Suzanne)

Introduction to IPM (activities 2-5 may be done in small groups as a jigsaw)

Activity 2 – Power Point presentation: Integrated Pest Management (John)
Activity 3 –Farmer John's Corn: A Case Study (Kim)
Activity 4 – Power Point presentation: Case Study of Biological Pest Control –***Bufo marinus*** (Jessica)
Activity 5 – Current Event IPM (Kim)

Principles of Scientific Sampling

Activity 6 – Jelly Beans (Kim)

Needs Assessment

Activity 7 – School Assessment (Kim)

Developing a Plan

Activity 8 – IPM Pyramid (Kim)
http://paipm.cas.psu.edu/pdf/PyramidPDF1.pdf

Activity 1 – Carousel Brainstorming

Carousel Brainstorming is a technique used to determine prior knowledge. This type of brainstorming typically asks open-ended questions as to illicit multiple responses.
The following link is a very general explanation of carousel brainstorming
http://www.ncrel.org/tech/tpd/res/cluster1/g03i.htm

It is recommended to divide students into 4-6 groups, depending upon class size.

For IPM, the following 6 questions may be used, (or generate some of your own specific to your school!)

1. What do you think I. P. M. is?
2. What are the worst pest problems you see at home?
3. What is the relationship between insect pests and beneficial insects?
4. A custodian finds a cockroach in the 2nd floor supply closet, what action do you think the custodian should take?
5. Besides students, name 4 major pests our school needs to control.
6. Before applying fertilizer to the school landscape, what factors do you think need to be taken into consideration?

Responses can be written on butcher block paper and posted around the room. Changes can be made as the students progress through the unit.

Activity 3 – Farmer John's Corn

A Case Study

Farmer John Smith is getting ready to choose what types of corn he would like to plant for next year's crop. John will be making these decisions based on a sound IPM management program. John along with his agronomist scout fields all summer to determine types of pests and infestation rates of particular pests. Based on this information, John determines what types of pest control programs to use both for insect and weed control in his corn fields.

This year John tried something new. In 2 out of 5 of John's corn pieces had a corn borer problem last year. (Your first assignment is to look up corn borer and be able to identify it and the way that it infects the corn plant) So as part of John's IPM program he planted those 2 fields to corn with the Bt gene. (Find information on the Bt gene at the web site for the University of Minnesota Extension Service- http://www.extension.umn.edu/distribution/cropsystems/DC7055.html)
As part of a good IPM strategy, John is on a crop rotation pattern to break the cycle of many pests that plague his area, however the European corn borer continues to be a problem in the two fields we mentioned. John had an option to spray chemicals on his field this year or try the Bt corn. What are some of the reasons why John chose Bt corn over pesticide application?

Next you will need to determine if the Bt corn was effective in controlling the borer problem, and whether or not John should choose to plant Bt corn next corn season, and if so how much would you recommend he plant? Your answer should be based on the following corn borer scouting data:

Last Years Data:

Date/# of borers present:
5/31- 10 adults/55plants
6/15- 25 adults/55 plants
7/01- 45 adults/55 plants
7/15- 75 adults/55 plants
8/01-125 adults/55 plants
8/15- 155 adults/55 plants
9/01- 175 adults/55 plants
9/15- 175 adults/55 plants
(these numbers are the average of the 2 infected fields)

This Years Data-using Bt corn:
Date/# of borers present:
5/31- 10 adults/55 plants
6/15- 25 adults/55 plants
7/01- 50 adults/110 plants
7/15- 27 adults/55 plants
8/01- 40 adults/110 plants
8/15- 29 adults/55 plants
9/01- 47 adults/110 plants
9/15- 28 adults/55 plants
(the above numbers are the average of the 2 infected fields)

To answer this question you will need to determine what the threshold numbers should be for the corn borer both European and northern/western cornborer. Information is in the handout from "Managing Field Corn Pest Problems" Corn Guidelines-Cornell Field Crops Management Manual.

Extra Credit:

If the 3 unaffected fields last year were in their first year of corn, do you think that corn borer pressure would be a problem this year…and why? (5 extra points)

Activity 5 – IPM Current Events

Students should research IPM current events on the web. They need to find one recent current event article (or use the following article) and prepare one page summary report with their opinion.

Article that introduces IPM: Taken from "AgNews: News and Public Affairs" Texas A&M University Agriculture Program. Sept. 18,2002.

"Integrated Pest Management Now Nationally-Accepted Practice"
Writer: Beth Barbee

COLLEGE STATION- What began 30 years ago as a lofty notion to partner with nature when controlling pest problems has blossomed into a nationally-accepted practice that saves the environment, money and reduces pesticide use.

This new approach, termed Integrated Pest Management, applied a holistic solution to the problem of managing harmful insects, weeds and plant diseases.

Dr. Perry Adkisson at Texas A&M university and Dr. Ray Smith at the University of California were among the first to deduce that most plant diseases, weeds, insects, and other pests could be controlled by employing good crop management practices and maximizing the many controls already existing in nature.

This was a favorable alternative to the rampant overuse of chemical pesticides occurring at the time, said Dr. Tom Fuchs, coordinator of the Texas IPM program for Texas Cooperative Extension.

The overuse of pesticides was not only killing pests, he said, but natural enemies of pests also, upsetting one of nature's own system to keep pests in check. While pesticides remain a part of IPM, the products least toxic to humans and beneficial organisms are preferred and pesticides are used only when necessary.

IPM came to Texas in an organized way in 1972, when four Extension pest management agents, employed by Texas Cooperative Extension, began to work with producers year round in cotton producing regions of the state. With the success of the cotton IPM programs, Fuchs recalled, sorghum and peanut programs were soon added. Soon crop producers across the state were converts, using natural enemies, crop rotation, plating dates, and other biological and mechanical controls to manage pests in many different commodities.

"IPM is not doing something just because your neighbor ro someone at the coffee shop is doing it," Fuchs said. "It is a strategy of managing pests that is designed to meet an individual's production goals in the most economically and environmentally sound manner possible using a combination of control tactics. IPM strategies can be developed for any level of production of any commodity."

Today, IPM"s holistic approach to solving pest problems is widely practiced in fields, crops, homes, and schoolyards. The Texxas IPM Program is a partnership between Texas Cooperative Extension, Texas Agricultural Experiment Station, Texas Pest Management Association, Texas Department of Agriculture, Cooperative State Research, Education and Extension Services, and the state's citizens. Private IPM consultants are also important partners and are responsible for much of the day to day implementation of IPM.

IPM use in Texas' crops has led to a reduction in pesticide use, which helps to preserve the environment and reduce run-off into drinking water. According to the National Center for Food and Agriculture Policy, the pounds of insecticide applied per acre to cotton and corn in Texas, for examle, decreased by 50 and 69 percent, respectively, from 1979 to 1991.

"Although IPM can't take full credit for the dramatic decrease in insecticides, we believe that the wider acceptance of IPM practices has had an important impact," Fuchs said.

In 1995, the Texas Extension IPM team was awarded the Governor's Clean Texas 2000 Award for Environmental Excellence by the Texas Natural Resource Conservation Commission and a USDA Honor Award in Environmental Protection.

The reduction in chemical pesticides is not the only benefit to adopting IPM practices. Texas producers have seen increases in yields and net profits using IPM. It is estimated that IPM has a $340 million annual impact on the state's economy.

Pest problems don't happen only in crops. IPM is a statewide leader in helping keep schools and daycare facilities clean and safe for children. The Southwest Technical Resource Center for Schools and Daycares was established at the Texas A&M Center at Dallas in 2001 through a grant from the Environmental Protection Agency. The center's goal is to educate pesticide applicators and those in charge of maintaining school rounds on the safest possible ways to keep cafeterias, playgrounds, and school yards pest free.

"Whether it be inside the home, in the yard or garden, or in crop fields, IPM continues to strive to apply the best science available to solve pest problems in an environmentally friendly way," Fuchs said.

Activity 6 – Jelly Beans

Activity for Principles of Scientific Sampling:

1. gather up jelly beans of two colors, (one needs to be black), a plate, a coffee can or pot and tow colors of cooking beans (should be the same size- you'll need about 1 cup of one color, 3 cups of the other but don't mix up ahead of time, a couple other miscellaneous items a paper clip, a button, or any other thing like this. (this exercise is from http://www.nysaes.cornell.edu/ipmnet/sare.mod/)
2. Arrange 20 jelly beans on a plate. Hand out the Sampling Exercise Data Sheet:
3. What is the ratio of black beans to red?
4. Offer one bean to each participant until 10 are gone, now what is the ratio? What influenced your decision on which flavor you took? Did bias enter the sample? And How? How does this relate to sampling for pests at your school?
5. What can be done to avoid bias in our sampling procedures?
6. Now in front of the class take the big amounts of beans and your other pests (paperclip…etc.) mix them in your coffee can, ask for a volunteer to take this home and count each pest and be sure to put emphasis on the need for accuracy of +/- 5%. THIS SHOULD ELLICIT PROTEST!!!
7. Continue with questions: Is counting every single pest the most accurate way to determine damage or pest population? Sure if you have the time.
   Is counting every single pest any more practical than the using just one sample? No. who has the time. What truth can we glean from this information? Balance the sample size and frequency between too few samples and too many samples.

Sampling Exercise Data Sheet: Worksheet for Activity:

1. The Need to Be Unbiased
   Number of red jelly beans chosen:____
   Number of black jelly beans chosen:____
   Ratio of sample:____
   Original ratio:_____

2. The pitfall of one sample
   Bean color:____ ratio of red beans to white beans in container is 1 cup to 3 cups or 25:75%

3. Adequate Sample Size:

Sample Set	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
# of red beans (damaged plants										
Running total of red beans (damaged plants										
Running total of all beans (all plants sampled)	10	20	30	40	50	60	70	80	90	100
% of red beans (% of damaged plants)										
Degree of accuracy of ratio (total/damaged)										

How to calculate degree of accuracy (example):
*Assume that a sample from the 4th row indicates that 40% of plants are damaged.
*But we know that damaged plants comprise 25% of the sample
*Subtract 25 from 40. Your result? 15. Thus

*The degree of accuracy is plus or minus 15%. We express it as +/- 15%

We want a degree of accuracy of +/-5%. Calculate the degree of accuracy for each set.

Activity 7 – School Assessment

Knowing how many pests are in your designated area helps you determine their damage potential. But who has the time or money to count them all-if even you could? A smaller portion of the population-an estimate, or sample-will efficiently indicate population size.

If you have five areas, lawn/buildings, you'll need to scout each one because each area is different. Can you afford to spend a large amount of time in each area? Probably not! To save time, you need to know the smallest sample size and number that will adequately describe the pest population. And while you're out sampling pests, you can keep tabs on beneficial insects too.

A certain minimum number of samples will provide accuracy while limiting your time in the field. But is it 10 samples, 20,30,or more? Research scientists have experimentally determined the best answer for each type of pest.

Sequential sampling

This labor-saving sampling method puts pests into two basic categories depending on their population density. On the average, the sequential method requires fewer samples than conventional sampling schemes.

If populations are high, a few samples will tell you that it's time to act. If populations are low, you can quickly decide that you have little cause for concern.

On the other hand, at intermediate levels you may need to take a number of samples to make a confident decision. With certain pests, you may need to come several weeks in a row after a "don't treat" diagnosis and sample again.

Activity for Threshold:

1. Have the students find their own thresholds for pests that are known in the school… these can be found at various web sites. There is much information on the web about IPM strategies and what are treatable levels of pests. EPA and many state universities have established IPM protocols and can be found easily. Also have available your schools IPM strategy or what the school currently does for pest management.

Activity 8 – Develop a School IPM

See PA web site for activities and resources for developing and implementing a school IPM.

http://paipm.cas.psu.edu/index.html