The Importance of Mapping in an IPM Program

Introduction

Integrated Pest Management (IPM), or Intelligent Plant Management, involves assessing the entire golf course property, identifying areas where agronomic stresses may occur and noting places where turf pests are present and cause damage. While most golf course superintendents have excellent observational skills, it is sometimes difficult to remember what happened two months ago, and even harder to remember what challenges arose a year ago. One tool that has proven to be helpful has been to create a series of maps that can be recorded digitally and can be used to track changes on the golf course over time.

Why create maps?

Mapping the property is an excellent way to note changes as they occur. Maps can be created to show the distribution of pest activity and track that activity over time. For example, you might observe patches of dollar spot in a few locations one week, and then note the following week that additional areas have become diseased – or that the original areas of pathogen activity have grown considerably. Comparing maps that were created last year (or even further back) with current maps can indicate where turf pests are recurring and might help you identify areas that might be serving as pest "reservoirs". For example, annual bluegrass weevil adults often spend the winter in leaf litter in wooded areas bordering the fairways, but they can also overwinter in high grasses surrounding ponds or in natural areas. Mapping the course may help you to identify some of those overwintering "hotspots".

Maps can also be used to indicate areas where agronomic stresses (e.g., localized dry spots, poor drainage, poor irrigation distribution) occur and track those stresses over time. It can be very helpful to create a library of these maps, tracking soil moisture imbalances or evidence of compaction or areas where thatch is unusually thick or dense over a period of time. Maintaining a file of maps can help you see what is happening over time, and can help you anticipate what might develop in the coming months.

Maps can also facilitate discussions with greens committees, members, owners, or the general public. Maps are a form of visual communication and can often tell a story more effectively than a verbal explanation or a written description. Maps can eliminate extraneous information and get to the heart of the matter. If you sketch the locations where you have noticed an increasing density of crabgrass on the fairways, you may be able to identify conditions (e.g., increased compaction because of heavy cart traffic) that are leading to that increase. You might be able to use that information to convince your members to honor golf etiquette and keep the carts away from greens and tees.

You can create a map of the putting greens, indicate areas around the greens where annual bluegrass weevil activity has been most noticeable, and overlay markings to denote where annual bluegrass is most prevalent. Often you will see a direct overlap. This representation could serve as an opportunity to explain to your membership why you are trying to reduce the amount of annual bluegrass in the greens and surrounding areas.

Ways to create maps

There are many mapping options that are available to superintendents now, including computer-generated maps and others that are created from hard copy. Many superintendents like to provide their crew members with a small map of the golf course (or of the holes where they will be working), and instruct them to indicate areas on the map that correspond to anything they notice that is out of the ordinary while they are completing their tasks.

For example, a worker might notice some white cottony masses on a fairway after a warm and humid night, and circle the corresponding location on the map. The worker can bring the map to the superintendent or the assistant, and they can go out to take a closer look. Maps derived from clubhouse place mats or score cards can be perfect for this purpose.

Examples of maps:

- **Irrigation or drainage blue prints** can be reduced in size digitally to provide a map of the full course layout. These can then be used to mark areas where agronomic stress or pest activity is apparent.
- **GPS images** can be downloaded and provide a great deal of information about the property. Depending on the time of year when the photo was taken, the image might reveal a lot about underlying drainage, underlying streams, localized dry spots, irrigation "misses", and more. The images can be manipulated by adding labels or shading parts of the image to indicate areas of interest.
- **Aerial photos** were the precursor to GPS images, and can provide even more detailed (higher resolution) images. Some superintendents contract with a local pilot to take aerial images using infrared photography or other imaging systems that can reveal plant stresses before those stresses become apparent in the visual spectrum.
- **Placemats** with a map of the course layout are used in several clubhouses. These placemats can be used "as is" or reduced to a smaller size to be carried by crew members as they move about the golf course. As noted above, the worker can indicate areas that might need a more detailed inspection by the superintendent or assistant superintendent or IPM specialist.
- **Scorecards** that include a sketch of each hole can also be used to provide sketches of hole layouts for crew members to carry.
- **Hand-drawn sketches** are perfectly appropriate as well. The initial "map" indicating agronomic imbalance or pest activity does not need to be very accurate, as long as the area needing attention can be identified.

Digitizing records

Creating a series of maps that tracks the condition of the golf course over time, showing where agronomic stresses occur or where pest activity increases, can provide a tremendous amount of information to guide a superintendent's management decisions. The challenge is finding a way to be able to review the maps and find ones of particular interest. One way to do this is to digitize the maps as they are created. You could scan the map or you could take a photo of it with your cell phone and email the photo to yourself.

Create several appropriate computer files – perhaps sorting by month and year for one file, including maps that indicate soil moisture issues (e.g., localized dry spots, drainage issues, local

flooding) in another file, or maps that indicate presence and intensity of pest activity. Because you can duplicate files, you can "create" as many copies of each map as you need, and put one in each of the appropriate file folders on the computer.

Don't forget to back up your files regularly!

Case study – mapping white grub activity

In the late 1980s, Dr. Mike Villani (a turf entomologist at Cornell University, who tragically died of pancreatic cancer in 2001) showed superintendents how they could scout their fairways and determine where white grub activity was greatest. He arranged for four people to move down the fairway and take a soil sample every 30 yards. Two people were positioned about three yards in from the edge on either side, and the other two arranged themselves so they were roughly a third of the way in from the edge on either side. They would take a cupcutter sample from each location, inspect it for grub activity, and indicate the number of grubs on a map of the hole. Because a cupcutter is very nearly 0.1 square foot, they could multiply the number of grubs by 10 and get an estimate of the grub population. They found that mapping in this manner identified several clear "hot spots" where grub activity was much higher than other parts of the course, and control measures were concentrated in those "hot spots".

Dr. Villani found that a thorough map of a golf course could be completed with an average of two hours of labor for each hole. (It would certainly take longer if there were a steady stream of golfers playing at the time the workers were sampling.) A quick economic analysis suggests that conducting such a grub survey might take about 36 hours for an 18-hole course. At $20 per hour, the labor would cost $720. If the survey indicated there were only a few hot spots that needed an insecticide application, the cost savings in reducing the amount of insecticide used could make the survey economically viable.