

Producing an IPM Template to Assist Golf Course Superintendents in Developing Written IPM Plans for Golf Courses

Progress Report
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Submitted by:

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I. Background:

The two-year project, "Producing an IPM Template to Assist Golf Course Superintendents in Developing Written IPM Plans for Golf Courses", was designed to produce a set of science-based templates that can be used by golf course superintendents in developing, implementing, updating and assessing the effectiveness of IPM programs.

II. Experimental Objectives:

1. Produce a set of templates (written procedures, pest identification guides, agronomic guidelines and other reference materials, spreadsheets, record keeping forms and planning calendars) that will guide golf course superintendents towards development and implementation of IPM plans that meet environmental, agronomic and budgetary goals.
2. Ensure that templates are flexible enough to accommodate site-specific conditions, as well as varying levels of superintendent technical expertise and golf course budget constraints.
3. Evaluate the feasibility of these templates through periodic review and testing by superintendents, and make necessary changes based on their input.
4. Recommend methods for dispersing the templates to the superintendent community.

III. Progress on Objectives: During the project's third six month period, we have prepared a draft IPM template that will be distributed to superintendent review panels for their input. Based upon their comments, a final version of the template will be produced, submitted for final review and input, and then completed.

- a) Objective 1: A draft IPM template (including instructions, forms and references) was prepared. Features of these documents include:
 - a) Instructions are designed to give users as much information as possible about each step of the template process by providing:
 - i) estimated time required to complete each procedure
 - ii) materials needed to complete each procedure
 - iii) how each procedure fits into the overall IPM planning process
- b) Objective 2:

All documents and activities in the draft template (with one exception) are designed for use as hard paper copies with manual entry of information. Electronic versions of all documents will be developed (and submitted with the project's final report in spring, 2008) once superintendent input on this early draft of the template is received. The finished plan will be customized to meet the superintendent's specific needs by integrating the following information into the completed plan:

- i) Site-specific climate data
- ii) Site-specific soil information
- iii) Identification of specific management zones and sub-zones that require customized approaches
- iv) Identification of key pests in each management zone

The first step in testing the template for its clarity, robustness and comprehensiveness took place June 14, 2007 when cooperators Umeda, Gelernter and Stowell met at Fairbanks Ranch Country Club in San Diego (Brian Darrock, superintendent), and attempted to complete an IPM Plan using a rough draft of the template. During this visit, we identified gaps in information and reference materials that have been addressed in the attached draft IPM Template.

- c) Objective 3: A superintendent review panel composed of members selected by this research committee was identified in our last report. Added to this group are additional members proposed by GCSAA; of those contacted by GCSAA to participate, two responded favorably (see Table 1 below). This review panel has already been contacted for initial input on key pests of golf course turf (see Table 2 below). This group will each receive the IPM Template (Draft 1) that is included in this report. Instructions and forms for recording superintendent input are included in this package.

IV. Work to be implemented April, 2008 – November, 2008

- Based on input from the superintendent review panel, adjustments will be made to the current IPM Template
- Electronic versions of all documents will be designed to facilitate online data entry, as well as computation of key benchmarks such as pounds of pesticide active ingredient applied each year and costs of inputs utilized each year.

The revised template, including electronic forms, will be sent out to the superintendent review panel once again for final input. The final version of the template will then be designed and submitted to GCSAA.

- The final report will also contain recommendations for dispersal of the IPM template to the turf manager community.
- Where feasible, instructions, forms and reporting will be dove-tailed with GCSAA's Pesticide Use Survey, as well as the GCSAA-funded study 'Environmental characteristics of golf course pesticides: A comparison resource'.

V. A note on timing of reports and study completion

The current report, dated April 4, 2008, was due for submission in November 2007. GCSAA was informed of the delay in completion of this report. Because document generation and superintendent feedback are a time-consuming process, we expect that the final report for this project will not be completed until November, 2008.

Table 1. Superintendent Review Panel. Members recently added, at the suggestion of GCSAA are shown in bold type.

Mike Claffey	Cape Fear CC, Wilmington, NC
Dan Dinelli	North Shore CC, Glenview, IL
Shawn Emerson	Desert Mountain, Scottsdale, AZ
Larry Gilhuly	USGA Green Section, Northwest Region
Kevin Hutchins	Mission Viejo CC, Mission Viejo, CA
Jon Jennings, CGCS	Chicago Golf Club, Wheaton, IL
Michael O'Connor	GreenSpace Sustainable Environments LLC
Clark Throssel	GCSAA

IPM Template Table of Contents.

Black type = completed as of 4/08; **Green type** = to be completed for final report

Instructions

The IPM Template Roadmap (recommended sequence of events for completing the IPM Template)

Setting your goals

Producing your Climate Appraisal

Filling out the Management Zone Inventory

Filling out your Pest Worksheet

Filling out your IPM Planner

Providing input on Draft 1 of the IPM Template

Record Keeping

Product selection worksheet

Using Monitoring Logs

Progress against goals

Updating your IPM Plan

Forms

Setting your goals

Climate appraisal computer data entry form

Metric Form

English Form

Management zone inventory form

Pest Worksheet

Sample Pest Worksheet

IPM Planner

Sample IPM Planner

Input form for Draft 1 of the IPM Template

Record Keeping

Product selection worksheet

Monitoring Logs

Progress against goals

References

Soils

Monitoring salinity

Soil Calcium (Ca⁺⁺)
Soil Magnesium (Mg⁺⁺)
Soil Manganese (Mn⁺⁺)
Soil Nitrogen (N)
Soil Phosphorus (P)
Soil Potassium (K⁺)
Soil Sodium (Na⁺)

Disease References

Anthracnose, Colletotrichum cereale
Fairy ring
Gray leaf spot, Pyricularia grisea
Rapid blight, Labyrinthula terrestris
Rhizoctonia diseases
Yellow spot (algae, cyanobacteria)
Fungicide Resistance Management Groups
Selected Fungicide Active Ingredients and the Diseases they Control

Insect References

Annual white grubs
Ants, fire, Solenopsis invicta
Ants, nuisance, Lasius neoniger
Billbugs, Sphenophorus spp
Black cutworm, Agrotis ipsilon
Black turfgrass ataenius, Ataenius spretulus
Earthworms
Fall armyworm, Spodoptera frugiperda (J.E. Smith)
Green June beetle, Cotinus nitida (L.)
May and June beetles (2 and 3 year grubs), Phyllophaga spp.
Southern and tawny mole crickets, Scapteriscus borellii and vicinus
Monitoring for insects with soap flushes
Insecticide Resistance Management Groups
Selected Insecticide Active Ingredients and the Insects they Control

Weed References

Buckhorn plantain, Plantago lanceolata
Dandelion, Taraxacum officinale
Dollarweed (pennywort), Hydrocotyle spp.

Kikuyugrass, *Pennisetum clandestinum*

Large Crabgrass, *Digitaria sanguinalis*

Moss, *Bryum argenteum*

Purple nutsedge, *Cyperus rotundus*

Virginia buttonweed, *Diodia virginiana*

Yellow nutsedge, *Cyperus esculentus*

Herbicide resistance management groups

Selected Herbicide Active Ingredients and the Weeds they Control

Turf sensitivity to herbicides

Weather References

Using threat temperatures for IPM Planning

Using growth potentials for IPM Planning