



NEW YORK STATE
BEST MANAGEMENT PRACTICES
SURVEY RESULTS

Contents

- Introduction..... 1
- BMP Assessment Survey Results 1
 - Demographic Information (NYS respondents only) 2
 - Questions/Answers/Responses 2
 - General Section..... 3
 - Irrigation 4
 - Facilities 7
 - Cultural Practices10
 - Nutrients.....12
 - Pests14

Introduction

As part of the New York State Best Management Practices (NYS BMP) project, New York State golf course superintendents and Cornell University created a quiz and assessment survey to test superintendents and others involved in the golf industry on their level of knowledge and implementation of BMPs on the state's golf courses. The BMP quiz and assessment survey were designed to achieve a number of goals:

- to provide verifiable evidence for NYS regulatory agencies that a majority of New York State golf course superintendents are utilizing the NYS BMP information
- as an educational tool to assist superintendents in identifying areas for potential improvement in their golf course management operations
- to encourage the use of the NYS BMP materials by identifying which topics are of greatest relevance
- to design an educational program that meets the needs of superintendents and assistant superintendents based on an analysis of the results

Superintendents throughout the state were asked to take both the pre-assessment quiz and survey during the survey period from December 10, 2015 through March 15, 2016. This report details the responses of the people who completed the pre-assessment quiz.

BMP Assessment Survey Results

The BMP assessment survey was designed to provide information from survey respondents on the management practices being utilized on NYS golf courses. Of the 112 completed surveys, 104 were completed by survey respondents representing a NYS golf course. The survey was divided into six sections:

- general questions
- irrigation
- facilities
- cultural practices
- nutrients
- pests

Overall, 112 people completed the survey; of these completed surveys, 104 were completed by survey respondents representing a NYS golf course. A majority, 95 respondents (85%) reported having received an email from a NYS superintendent with the link to the quiz. The New York State Turf Association (NYSTA) also sent out emails with a link to the survey; 26 respondents (23%) had received an email from NYSTA about the quiz. 19 people (17%) reported having learned of the quiz during an in-person presentation; and a few also reported having seen links to the survey in some other way (a social media post, newsletter article, etc.).

Demographic Information (NYS respondents only)

Geographic distribution of respondents who represent a NYS golf course, by County:

Albany	1
Allegany	1
Broome	2
Cayuga	2
Chautauqua	1
Chemung	1
Chenango	1
Cortland	1
Dutchess	3

Erie	9
Herkimer	1
Madison	1
Monroe	6
Nassau	16
Onondaga	5
Ontario	1
Orange	3
Oswego	1

Putnam	2
Rockland	3
Saratoga	2
Suffolk	11
Ulster	2
Wayne	3
Westchester	23

Role on the golf course:

Asst. Superintendents:	4
Club Owners:	3
Superintendents:	97

Average years of experience: 14.1 years

Education:

GED	1	1.0%
High School	6	5.8%
2 year certificate	15	14.4%
2 year college degree	20	19.2%
4 year college degree	56	53.8%
Masters Degree	5	4.8%
Winter School	1	1.0%

GCSAA Classification:

Certified Golf Course Superintendent	21	20.2%
Class A Golf Course Superintendent (A)	53	51.0%
Superintendent Member / Class B Golf Course Superintendent (SM/B)	20	19.2%
Class C Assistant Golf Course Superintendent (C)	5	4.8%
Affiliate (AF)	1	1.0%
No GCSAA Classification	4	3.8%

Questions/Answers/Responses

The survey was intended to get an overview of the current state of BMP implementation on New York's golf courses. As such, the answers were evaluated based on whether a practice aligns with the BMP recommendations or not. The preferred response is highlighted.

General Section

1. Priority areas have been identified on the golf course that are at greater risk for leaching and/or runoff (such as steep slopes, clay soils, karst topography, etc.).

- Yes**
- No**

Answers:

Yes	95	91.3%
No	9	8.7%

2. Drainage basins have been clearly outlined on a map of the golf course.

- Yes**
- No**

Answers:

Yes	70	67.3%
No	34	32.7%

3. Which of the following features or sensitive areas have been identified as either present or absent on the golf course? (select all that apply)

- Steep slopes**
- Karst topography**
- Shallow depth to groundwater**
- Listed species**

Answers:

Steep slopes	90	86.5%
Karst topography	23	22.1%
Shallow depth to groundwater	62	59.6%
Listed species	28	26.9%

4. Management zones (as defined on the BMP web site) have been established on the golf course.

- Yes**
- No**

Answers:

Yes	97	93.3%
No	7	6.7%

5. Is a water quality monitoring plan in place that identifies appropriate sampling locations, frequency, and monitoring parameters?

- Yes
- No

Answers:

Yes	65	62.5%
No	39	37.5%

Irrigation

1. Does your irrigation system offer site specific control (e.g. individual head control, weather station integration, etc.)?

- Yes
- No

Answers:

Yes	93	89.4%
No	11	10.6%

2. How could the irrigation system function be characterized?

- Optimal
- Functioning, but not optimal
- Needs replacement

Answers:

Optimal	54	51.9%
Functioning, but not optimal	41	39.4%
Needs replacement	9	8.7%

3. The infiltration rate is utilized for scheduling irrigation cycles.

- Yes
- No

Answers:

Yes	67	64.4%
No	37	35.6%

4. What approximate percentage of each area is irrigated?

- _____ Greens
- _____ Tees
- _____ Fairways
- _____ Roughs
- _____ Practice areas
- _____ Clubhouse grounds

Answers:

Area	Avg. % irrigated
Greens	96.8
Fairways	94.5
Roughs	93.3
Practice Areas	46.2
Clubhouse Grounds	63.8

5. Have you reduced your irrigation water usage by any of the methods listed below? (select all that apply)

- Planted drought resistant varieties
- Improved/updated irrigation system
- Reduced managed turf areas
- Improved soil water storage capabilities on sandy sites
- None

Answers:

Planted drought resistant varieties	57	54.8%
Improved/updated irrigation system	83	79.8%
Reduced managed turf areas	74	71.2%
Improved soil water storage capabilities on sandy sites	34	32.7%
None	6	5.8%

Ratings:

Excellent (2 or more methods)	83	79.8%
Good (1 method)	21	20.2%
Needs Improvement (none selected)	6	5.8%

6. Has the quality of the irrigation water supply source been analyzed?

- Yes
- No

Answers:

Yes	86	82.7%
No	18	17.3%

7. Which of the following methods are used to determine the irrigation water schedule? (select all that apply)

- Observations of turf
- Manual probe to determine soil moisture
- Soil moisture sensor reading
- Short term weather service forecast
- Long term weather service forecast
- Evapotranspiration (ET)

Answers:

Observations of turf	104	100.0%
Manual probe to determine soil moisture	90	86.5%
Soil moisture sensor reading	68	65.4%
Short term weather service forecast	98	94.2%
Long term weather service forecast	73	70.2%
Evapotranspiration (ET)	68	65.4%

Ratings:

Excellent (4 or more methods)	94	90.4%
Good (3 methods)	5	4.8%
Needs Improvement (2 or less methods)	5	4.8%

8. Is the irrigation system designed for flexibility when adjusting water quantity on a micro-climate basis (e.g. individual head control, percentage of ET adjustment, etc.)?

- Yes**
- No

Answers:

Yes	91	87.5%
No	13	12.5%

9. When was the last irrigation audit conducted (including self audits)?

- In the last year**
- Less than 3 years ago**
- 3-7 years ago
- Greater than 7 years ago
- Never

Answers:

In the last year	31	29.8%
Less than 3 years ago	21	20.2%
3-7 years ago	14	13.5%
Greater than 7 years ago	14	13.5%
Never	24	23.1%

10. What is the last date of any irrigation system improvement that increased efficiency, uniformity of distribution, or decreased water usage?

- In the last year
- Less than 3 years ago
- 3 - 7 years ago
- Greater than 7 years ago
- Never

Answers:

In the last year	60	57.7%
Less than 3 years ago	23	22.1%
3-7 years ago	10	9.6%
Greater than 7 years ago	7	6.7%
Never	4	3.8%

Facilities

1. Have any of the following guidelines for storing chemicals been adopted or implemented? (select all that apply)

- Storage facilities are structurally separate from “residential, office and general work areas; livestock quarters, food, feed or seed storage and water supply sources”. Storage is in separate buildings and at least 50 ft away from residential or farm property.
- Storage areas have a raised berm on all sides and an impervious surface for containment.
- Suggested spill containment material includes absorbent spill containment pads, sweeping compound, brushes or brooms, a dust pan, shovel and a disposal container or bag.
- Protective equipment is available near, but not within, the storage area.
- The storage facility is locked and properly posted with warnings.
- Local fire departments are aware of the pesticides and fertilizers stored and are provided with a “Fire and Spill Response Plan”.
- Chemicals are segregated by function (e.g. fungicide, insecticide, and herbicide) and hazard level. All flammable and “incompatible” materials are stored separately.
- Mixing areas are similarly bermed with impervious surfaces.
- Indoor mixing areas are properly vented.
- Bulk containers, construed to be equal to or greater than 55 gallons, are locked and drains are used to collect any spills into a containment area. The spill containment system has a capacity equal to or greater than 25% of the volume of pesticides stored.
- A water supply and wash station is located at or adjacent to the facility for emergencies.
- A suitable first aid kit for pesticide poisoning is nearby.
- Forced air vent systems exchange the air volume 3 to 4 times per hour as well as temperature control for keeping temperatures under 95°F and above freezing.

Answers:

Storage facilities are structurally separate And in separate buildings and at least 50 ft away from residential or farm property.	87	83.7%
Storage areas have a raised berm on all sides and an impervious surface for containment.	66	63.5%
Suggested spill containment material includes absorbent spill containment pads, sweeping compound, brushes or brooms, a dust pan, shovel and a disposal container or bag.	92	88.5%
Protective equipment is available near, but not within, the storage area.	98	94.2%
The storage facility is locked and properly posted with warnings.	94	90.4%
Local fire departments are aware of the pesticides and fertilizers stored and are provided with a "Fire and Spill Response Plan".	58	55.8%
Chemicals are segregated by function (e.g. fungicide, insecticide, and herbicide) and hazard level. All flammable and "incompatible" materials are stored separately.	82	78.8%
Mixing areas are similarly bermed with impervious surfaces.	29	27.9%
Indoor mixing areas are properly vented.	31	29.8%
Bulk containers...are locked and drains are used to collect any spills into a containment area. The spill containment system has a capacity equal to or greater than 25% of the volume of pesticides stored.	44	42.3%
A water supply and wash station is located at or adjacent to the facility for emergencies.	88	84.6%
A suitable first aid kit for pesticide poisoning is nearby.	66	63.5%
Forced air vent systems exchange the air volume 3 to 4 times per hour as well as temperature control for keeping temperatures under 95°F and above freezing.	56	53.8%

Ratings:

Excellent (12 or more selected)	17	16.3%
Good (10-11 selected)	23	22.1%
Needs Improvement (less than 10 selected)	64	61.5%

2. A pesticide emergency response plan has been prepared.

- Yes
- No

Answers:

Yes	59	56.7%
No	45	43.3%

3. The mixing and loading facilities have: (select all that apply)
- Impervious flooring
 - Flooring sloped to a drain
 - Curbing to contain at least 25% of the volume of liquid chemicals and fertilizers stored
 - Ventilation to exhaust any fumes in the event of a spill
 - Personal Protective Equipment (PPE) for workers
 - Emergency wash stations
 - None of the above

Answers:

Impervious flooring	62	59.6%
Flooring sloped to a drain	39	37.5%
Curbing to contain at least 25% of the volume of liquid chemicals and fertilizers stored	31	29.8%
Ventilation to exhaust any fumes in the event of a spill	55	52.9%
Personal Protective Equipment (PPE) for workers	96	92.3%
Emergency wash stations	78	75.0%

Ratings:

Excellent (all 6 selected)	12	11.5%
Good (4 or 5 selected)	42	40.4%
Needs Improvement (less than 4 selected)	50	48.1%

4. Clippings on equipment are typically managed using the following method:
- Not removed prior to washing
 - Blown off using compressed air**
 - Screened from wastewater using sumps**
 - Other (please specify) _____

Answers:

Not removed prior to washing	30	28.8%
Blown off using compressed air	50	48.1%
Screened from wastewater using sumps	22	21.2%
Other (please specify)	2	1.9%

Other comments:

- Most are blown off using a backpack blower first then washed clean.
- Returned to the earth / not collected. Equipment washed off in the field.

5. If using public water for mixing and loading of pesticides, is an approved backflow prevention device (BPD) in place?
- Yes**
 - No
 - Not applicable**

Answers:

Yes	52	50.0%
No	2	1.9%
N/A	50	48.1%

Cultural Practices

1. What are the age ranges of greens, tees, and fairways?

	Greens	Tees	Fairways
<6 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6-15 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15-30 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
>30 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't Know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Answers:

	Greens	Tees	Fairways
<6 years	4	10	2
6-15 years	15	20	12
15-30 years	15	20	17
>30 years	75	61	75
Don't Know	2	2	2

2. Annual bluegrass is present on 50% or more of the areas managed as tees and fairways.
- Yes
 - No**

Answers:

Yes	62	59.6%
No	42	40.4%

3. Has 20% or more of turf density been lost on fairways due to injury or disease in the last 5 years?
- Yes
 - No**

Answers:

Yes	13	12.5%
No	91	87.5%

4. If #3 was answered Yes: Have you renovated with seed or sod in the last five years with better adapted species or varieties?
- Yes**
 - No

Answers: 9 out of 13 have renovated

5. How often is soil tested (on the greens) for organic matter?
- Annually**
 - Every 2-3 years**
 - Less than every 3 years
 - Never

Answers:

Annually	66	63.5%
Every 2-3 years	19	18.3%
Less than every 3 years	12	11.5%
Never	5	4.8%

6. The results from the last greens soil test for organic matter were:
- Adequate**
 - Acceptable**
 - Excessive
 - Not tested

Answers:

Adequate	39	37.5%
Acceptable	49	47.1%
Excessive	10	9.6%
No answer	6	5.8%

7. The organic matter program for greens includes (select all that apply):
- Topdressing
 - Core cultivation or venting
 - Fertilization rate adjustments
 - None of the above

Answers:

Topdressing	101	97.1%
Core cultivation or venting	104	100.0%
Fertilization rate adjustments	99	95.2%
None of the above	0	

Ratings:

Excellent (all 3 selected)	98	94.2%
Good (2 selected)	4	3.8%
Needs Improvement (1 selected or none)	2	1.9%

Nutrients

1. Is there a nutrient management plan or fertilizer program plan?

- Yes
- No

Answers:

Yes	101	97.1%
No	3	2.9%

2. Are grass clippings regularly collected on fairways?

- Yes
- No

Answers:

Yes	25	24.0%
No	79	76.0%

3. Are foliar tests conducted on sand-based greens as a diagnostic tool when problems occur?

- Yes
- No
- Not applicable

Answers:

Yes	40	38.5%
No	26	25.0%
N/A	38	36.5%

4. What factors are used to determine nutrient applications? (select all that apply)

- Soil type
- Recent analysis
- Organic matter amounts
- Turf type (rooting depth)
- Golf course area
- Short term weather forecast
- Nutrient source
- Potential for off-site movement
- Proximity to at risk areas

Answers:

Soil Type	94	90.4%
Recent analysis	88	84.6%
Organic matter amounts	73	70.2%
Turf type (rooting depth)	94	90.4%
Golf course area	97	93.3%
Short term weather forecast	91	87.5%
Nutrient source	92	88.5%
Potential for off-site movement	80	76.9%
Proximity to at risk areas	75	72.1%

Ratings:

Excellent (8 or more selected)	66	63.5%
Good (5-7 selected)	29	27.9%
Needs Improvement (4 or fewer selected)	9	8.7%

5. How is the appropriate source of nutrients and rates of applications determined?

- Soil type
- Area
- Visual observation
- Soil/tissue testing
- Fertilizer label

Answers:

Soil type	82	78.8%
Area	87	83.7%
Visual observation	90	86.5%
Soil/tissue testing	83	79.8%
Fertilizer label	92	88.5%

Ratings:

Excellent (all 5 selected)	57	54.8%
Good (4 selected)	23	22.1%
Needs Improvement (3 or fewer selected)	24	23.1%

6. How often is fertilizer equipment calibrated?

- Every time before being used**
- Every 4th application
- Monthly
- Seasonally
- Never

Answers:

Every time before being used	62	59.6%
Every 4th application	7	6.7%
Monthly	13	12.5%
Seasonally	22	21.2%

7. What is the maximum rate of application of water soluble nitrogen on sand based soils?

- Less than 0.5 lbs N/1000 sq. ft**
- 0.5 – 0.7 lb N/1000 sq. ft
- Greater than 0.7 lb N/1000 sq. ft
- Don't know

Answers:

Less than 0.5 lbs N/1000 sq. ft	75	72.1%
0.5 – 0.7 lb N/1000 sq. ft	15	14.4%
Greater than 0.7 lb N/1000 sq. ft	1	1.0%
Don't know	13	12.5%

Pests

1. Is there a written Integrated Pest Management (IPM) plan available for review?

- Yes**
- No

Answers:

Yes	32	30.8%
No	72	69.2%

2. What methods are used to assess pest pressure? (select all that apply)

- Monitor weather patterns
- Scouting
- Record keeping
- Aerial imaging
- Weed mapping
- Insect trapping/sampling
- Pest forecast models /growing degree days

Answers:

Monitor weather patterns	100	96.2%
Scouting	103	99.0%
Record keeping	89	85.6%
Aerial imaging	4	3.8%
Weed mapping	55	52.9%
Insect trapping/sampling	75	72.1%
Pest forecast models /growing degree days	96	92.3%

Ratings:

Excellent (5 or more selected)	42	40.4%
Good (3 or 4 selected)	56	53.8%
Needs Improvement (3 or fewer selected)	6	5.8%

3. In the last 5 years, what site modifications have been implemented in order to reduce pest pressure? (select all that apply)

- Tree removal
- Fans
- Planting of a barrier strip of an alternate species to deter migration of pests into playing surfaces
- Other _____
- None

Answers:

Tree removal	96	92.3%
Fans	21	20.2%
Planting of a barrier strip	9	8.7%
None	0	0.0%
Other*	24	23.1%

Ratings:

Excellent (at least 2 selected)	42	40.4%
Good (1 selected)	56	53.8%
Needs Improvement (None selected)	6	5.8%

*Text entries for Other:

- Change type of turf being managed
- dew whipping and dragging
- paid entomologist to scout/threshold weevils
- Scouting leading to reduced chemical applications.
- removal of litter/debris that insect overwinter
- Change of grass species
- thatch removal
- drainage, venting
- rebuilt a few tees and greens
- tree root pruning
- Seeded with more disease resistant varieties
- Grass Type Change
- Rolling turf; naturalizing buffers
- Raising height of cut
- improved drainage
- increased fairway aeration
- Drill and fill aeration, select reconstruction of greens
- Improve overall plant health
- bird houses
- drainage soil modification
- treat off green areas to alter target of pest
- Drainage
- some cultural and irrigation practices
- irrigation monitoring

4. What cultural practices have been modified to minimize pest pressure on fairways? (select all that apply)

- Mowing
- Mower blade maintenance
- Rolling
- Topdressing
- Planted new/different species/varieties
- Tree removal to decrease shading and increase air flow
- Minimized moisture stress and leaf wetness
- Irrigation
- Alter traffic patterns
- Fertilization
- Other _____

Answers:

Mowing	85	81.7%
Mower blade maintenance	87	83.7%
Rolling	23	22.1%
Topdressing	41	39.4%
Planted new/different species/varieties	44	42.3%
Tree removal to decrease shading and increase air flow	91	87.5%
Minimized moisture stress and leaf wetness	92	88.5%
Irrigation	90	86.5%
Alter traffic patterns	67	64.4%
Fertilization	95	91.3%
Other*	6	5.8%

Ratings:

Excellent (7 or more selected)	63	60.6%
Good (5 or 6 selected)	35	33.7%
Needs Improvement (4 or fewer selected)	6	5.8%

Other text entered:

- raise mowing height
- Upgraded Irrigation System
- None
- beneficial microbes and enzymes
- Improve plant health
- pesticide app grubs

5. The following criteria are evaluated when selecting a pesticide: (select all that apply)

- Regulatory considerations
- Weather
- Resistance management
- Cost
- Environmental Impact Quotient (EIQ)

Answers:

Regulatory considerations	95	91.3%
Weather	102	98.1%
Resistance management	100	96.2%
Cost	88	84.6%
Environmental Impact Quotient (EIQ)	66	63.5%

Ratings:

Excellent (all 5 selected)	51	49.0%
Good (3 or 4 selected)	52	50.0%
Needs Improvement (2 or less selected)	1	1.0%

6. What considerations are included in the timing of pesticide applications? (select all that apply)

- Application interval
- Pest pressure
- Pest stage
- Weather
- Irrigation scheduling
- Soil saturation
- Wind

Answers:

Application interval	102	98.1%
Pest pressure	102	98.1%
Pest stage	101	97.1%
Weather	104	100.0%
Irrigation scheduling	95	91.3%
Soil saturation	94	90.4%
Wind	101	97.1%

Ratings:

Excellent (all 7 selected)	85	81.7%
Good (5 or 6 selected)	17	16.3%
Needs Improvement (4 or less selected)	2	1.9%

7. An Environmental Impact Quotient (EIQ) has been calculated for: (select all that apply)

- Selecting a specific pesticide**
- The entire course for one season**
- The entire course, multiple seasons**
- Not calculated

Answers:

Selecting a specific pesticide	53	51.0%
The entire course for one season	16	15.4%
The entire course, multiple seasons	10	9.6%
Not calculated	48	46.2%

Ratings:

Excellent (Any of the three choices selected)	56	53.8%
Needs Improvement (Not calculated at all)	48	46.2%

8. Staff members have been trained in pest identification.

- Yes
- No

Answers:

Yes	101	97.1%
No	3	2.9%

9. Are pest and turf samples sent for identification to diagnose a problem on site when additional expertise is warranted?

- Yes
- No

Answers:

Yes	96	92.3%
No	8	7.7%