Golf Course Safety: Pesticide Application and Personal Protective Equipment

HIGHLIGHTS:

- Pesticides kill pests, cause permanent damage to people and the environment
- Treatment methods: timing is everything
- Personal Protective Equipment (PPE)
- General guidelines for PPE

Pesticides kill pests and herbicides eliminate unwanted plants and weeds. As intentional poisons, pesticides (including herbicides, insecticides and others) have the potential to cause permanent damage to people and the environment.

Health effects depend upon the type of pesticide. Some, such as the organophosphates and carbamates, affect the nervous system, while other less toxic pesticides may only irritate the skin or eyes.

Understanding the hazards involved with storing, mixing and applying pesticides and knowing what kind of controls and personal protective equipment (PPE) workers must use is necessary to prevent injury and adverse environmental impact.

Areas of Application

Tree Spraying: Tree spraying is done infrequently and may be completed by in-house staff or an outside contractor. The largest hazard of tree spraying is the high drift potential that can contaminate and adversely impact the golf course and surrounding residential properties. Because tree spraying is done with an upward spray, there is more opportunity for personal contact and for the pesticides to be carried longer distances.

Aquatic Application: Aquatic application is most often done to control algae and the odor of a water source on the course. This application is frequently completed by an outside contractor due to specific certification requirements.

Aerial Application: This is a rare application and is usually part of a state/county program to control invasive insects or tree disease control (i.e. citrus canker).

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Soil Injection: Soil Injection is a newer approach, and is used to avoid the hazards associated with drift and run off. Soil injection can be less costly and is just as effective as other pesticide application methods.

Turf Application: Pesticides are applied using “spray rigs” which are booms mounted on a piece of turf equipment. Other means of application are by a venturi proportioning valve on the sprinkler system and by hose application where the worker uses a proportioning rod inserted in a drum and connected to a hose-end sprayer. The worker walks the green or tee and sprays the turf with a hose-end nozzle.

No matter what type of application is used, it is important that the weather be closely monitored. Spraying on windy days should be avoided. If there is a breeze, application should take place with the air moving at a right angle to the movement of the rig or person applying the pesticide.

When spraying greens, move the flag sticks away from the green so there will be no overspray onto the pole or flag. Golfers smoke, eat and drink while on the course and it is important that they not have any incidental contact with items contaminated with toxic chemicals. Many states require golf courses to post notices for golfers and other users of the course regarding the chemicals that are being applied. Signage should state the time period when the area can be safely entered and used by golfers and visitors. Superintendents should investigate state regulations regarding these postings.

Treatment Methods

The major problem with applying pesticides and other chemicals to a golf course is timing. Most courses are open seven days a week, from dawn to dusk. Pesticides are ideally applied on closed holes in the evening or very early morning. Safe reentry information may be contained on the labels or determined by the applicator.

Chemigation: An irrigation system that allows timing flexibility and is a labor-saving option. Anti-siphon protection (a check valve) is a must so the pesticide cannot be drawn back into the drinking water supply.

IPM (Integrated Pest Management): IPM is a non-chemical based approach to controlling insects, weeds and other pests by focusing on pest prevention and alternatives to pesticide use. This is done by monitoring the turf for pests and establishing an acceptable threshold level. The turf is treated only when the acceptable level has been exceeded.

BMP (Best Management Practices): This may be the safest, most efficient method of turf treatment. You may find that using horticultural practices to reduce pesticide, fertilizer and water use may be most effective for a facility; however other methods may include aeration, slow release fertilizers, deep watering, higher mowing heights, etc. The soil pH directly affects the ability of soil to release plant nutrients. Lime application to raise soil pH can be as effective as fertilizer application.

Treatment Alternatives: Alternatives are most often used to save money. These can range from providing pesticide-free courses to limiting your treatments to greens and tees only, or even just the greens.

Turf Treatment Equipment

Choose turf treatment equipment that will minimize environmental, operator and public contact. If booms are used, it is important that the system is equipped with an airfoil to improve drift control.

- Tractor-pulled boom sprayer
  - Typically 150 gallon tank
  - Concentrate and water
  - Computer controls
  - Drift controls including pressure, proper nozzle, and “windfoil”
  - Fast
- Cart mounted spray rigs
- Other application equipment
  - Backpack sprayers
  - Handheld sprayers
  - Spreaders
  - Hose sprayers

Personal Protective Equipment (PPE)

Pesticides can enter the body through the skin, eyes, mouth and lungs. The most common cause of pesticide poisoning for applicators is through skin contact. For this reason it is imperative to avoid direct contact with pesticides by wearing the proper protective clothing. Always check the precautionary statement and pesticide label before taking any further steps. For each chemical, a Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) should be available. Since all golf course workers may not speak English, it is necessary that the risks and personal protection requirements be communicated in the worker's native language so that all workers understand the required safety precautions and necessary PPE.

Considerations:

- All potential routes of entry
- Concentrations
- Mixing methods, including closed systems and packet systems
- Application method
- Formulation
- Volatility
- Heat stress

General Guidelines for PPE

Gloves: Always wear unlined, chemical-resistant gloves. Elbow-length gloves give the greatest protection. Nitrile, butyl and neoprene offer best protection for dry and liquid pesticides. Never wear leather, cotton or cotton-lined gloves.

Body Covering: Long sleeve shirt/pants are acceptable for toxic categories III and IV. When applying categories I and II chemicals, provide and see that workers wear chemical protective suits that cover their entire body from wrist to ankles. Boots should also be provided. Workers should not wear their own leather work boots or sneakers when applying toxic chemicals.

Goggles: A face shield or goggles should be worn when mixing/loading pesticides. In situations where chemicals may contact the eyes, shielded safety glasses, a full-face respirator or a full-face shield should be worn. Also be careful of the headband; it is often made of a material which readily absorbs and holds chemicals. If possible, wear the strap under a head covering.

Respirators: Workers should wear respirators while mixing or filling highly toxic pesticides. Tight-fitting respirators require fit testing and the Respiratory Protection Program should be documented (see OSHA CFR 29 Part 1910.134).

Labels will indicate if a respirator is required and will generally specify which type:

- TC-21C/TC-84A – Half-Mask, Particulate, Disposable Respirators may use for dust, pollen, mists, welding fumes and certain pesticides applied in solid form.
- TC-23C or TC-21C/TC-84A – Dual Cartridge, Half-Mask Reusable Respirator may be used for protection against pesticides, as vapors/gases (depending on exposure concentration).
- TC-23C or TC-21C/TC-84A – Dual Cartridge, Full Face Reusable Respirator may be used for protection against pesticides, as vapors/gases (depending on exposure concentration). Offers protection against splash and eye contact.
- TC-23C or TC-21C/TC-84A – Powered Air-Purifying Respirator with Helmet may be used for protection against pesticides, as vapors/gases (depending on exposure concentration). Offers protection against splash and eye contact.
- TC-19C Airline Respirator with Hood or Full Face Mask may be used for protection against pesticides, as vapors/gases (depending on exposure concentration). Offers protection against splash and eye contact.
- TC-13F SCBA with Full Face Mask may be used for protection against pesticides, as vapors/gases (depending on exposure concentration). Offers protection against splash and eye contact.

Most commonly used:

- Charcoal with particulate pre-filter (23-C)
- Dust/Mist (21-C)

Consult the label to determine how often to change the cartridge. If this information is not provided on the label, change the cartridge in accordance with the respirator manufacturer's change-out guidelines or when odor (vapor or gas breakthrough) is detected by the respirator wearer.

Educate workers on maintaining, caring for and cleaning respirators. It is too common to see respirators lying about and, therefore, subject to contamination from other maintenance activities. Additionally, organic vapor cartridges contain activated carbon that will adsorb moisture from the air which results in decreased life of the cartridges. Respirators should be cleaned and stored in resealable bags or containers when not in use.

Para-Occupational Exposure

Otherwise referred to as take-home contamination, this exposure most often affects the immediate family of an exposed worker. Exposure prevention methods include:

- Showering and changing clothes at work if possible
- Providing and cleaning uniforms and protective gear
- Instructing workers not to wear contaminated clothing home
- Taking contaminated clothes home in plastic bag
- Leaving work boots at the golf course
- Washing work clothes separately:
  - run clothes through two complete cycles
  - clean the washing machine by running it empty to remove any residual contaminants
  - line dry the clothing

References and Resources

OSHA 29 CFR Part 1910.134, Respiratory Protection Standard.

NIH Pesticide Safety Handbook

http://www.niehs.nih.gov/health/materials/pesticide_safety_handbook_english_508.pdf

EPA Pesticides Website

http://www.epa.gov/pesticides/about/index.htm

Golf Course Superintendents Association of America publications and information on golf course pesticides

http://www.gcsaa.org

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