Pesticides, Wetlands and Watercourses

DEP Pesticide Program

Municipal Inland Wetland Commissioners Training Program

2010

What is a Pesticide?

- Any substance that controls, mitigates, or repels a pest

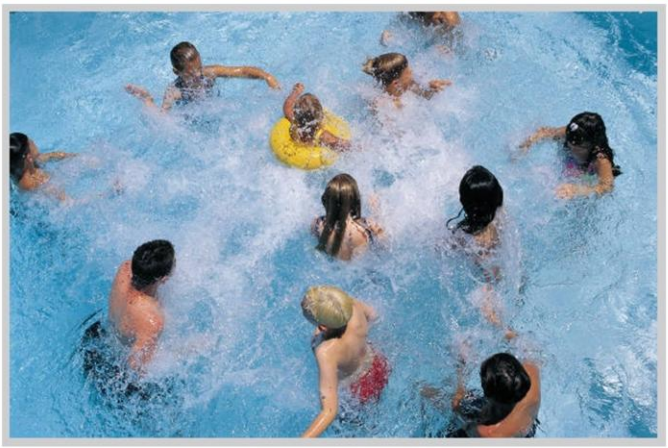
So what is a pest?

- Any organism that is deleterious to humans or the environment
- Can be insects, weeds, fungi, bacteria, or a host of others
- Pesticides therefore include herbicides, insecticides, fungicides, antimicrobials (including disinfectants)
- Exceptions – microorganisms in or on humans or animals (antibiotic drugs are not pesticides)

Why do we use pesticides?

- Crop protection
  - Herbicides actually more used than insecticides
- Human Health
  - Disease carriers
  - Disinfection
- Property maintenance
- Cost savings
- Biodiversity
  - Invasive plant control

Is there a pesticide in use here?



Swimming pool chlorinators are indeed pesticides

The point here is that concerns about swimming in herbicide treated waters need to be tempered with the realization that we swim in pesticide treated waters in other sites all the time.

Types of pesticides IWC's are most likely to encounter

- Aquatic herbicides and algaecides
  - IWC and the permit process
- Mosquito larvicides
  - Likely applied by state or town

Emphasis on aquatic algaecides and herbicides

How are pesticides regulated?

- Federal/state system
- Pre-marketing registration – both state and federal
  - Federal is primary – risk assessment conducted
  - Federal EPA has control over label language
- Certification (licensing) of applicators is delegated to states
- Enforcement also delegated to states
- States have additional requirements such as site-specific permits
- Towns have very little role in CT – state has exclusive authority

Registration process

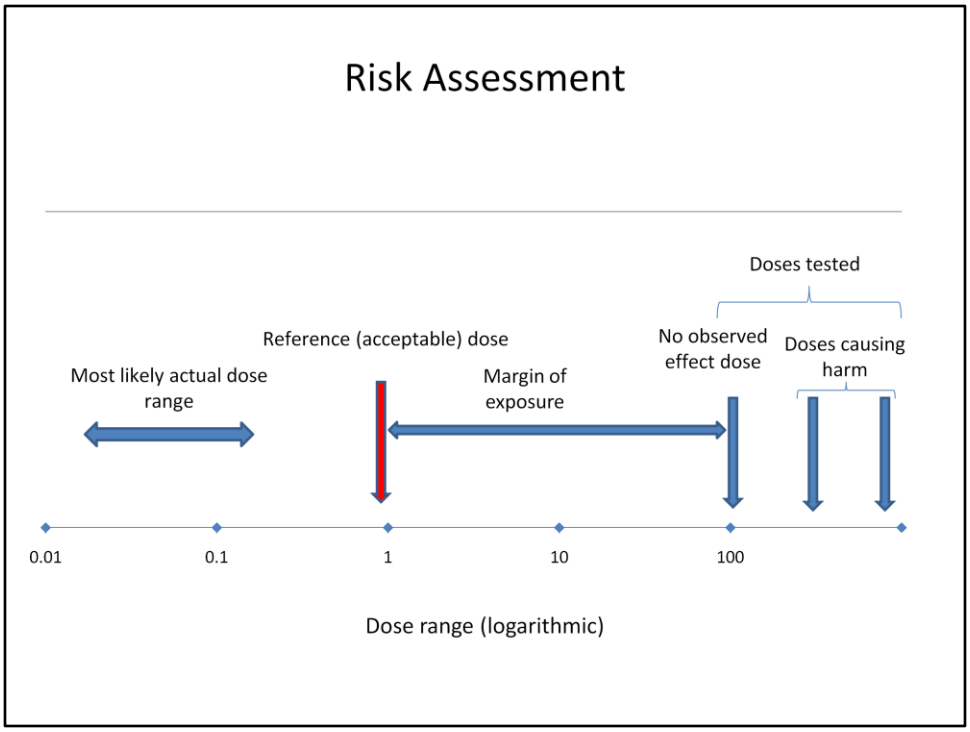
- Manufacturers must submit very detailed info to EPA
  - Toxicology
    - Acute & chronic
  - Environmental Fate
    - Persistence, leaching etc.
  - Fish & Wildlife hazard
    - Several indicator species
  - Physical/chemical Info
    - Solubility, vapor pressure, etc.

The above areas have many different studies and species examined in each.

Final registration decision is based upon risk assessment

- All of those studies establish doses of the pesticide that will not cause an effect
  - A 'margin of error' is added to account for inter- and intra-species differences
- This reference dose (for humans, wildlife etc.) is compared to dose expected in the environment
- Decision based upon sufficient margin between toxic level and expected exposure

The basic principle here is "the dose determines the poison". Toxicity is not a yes/no proposition, but a "how much" determination.



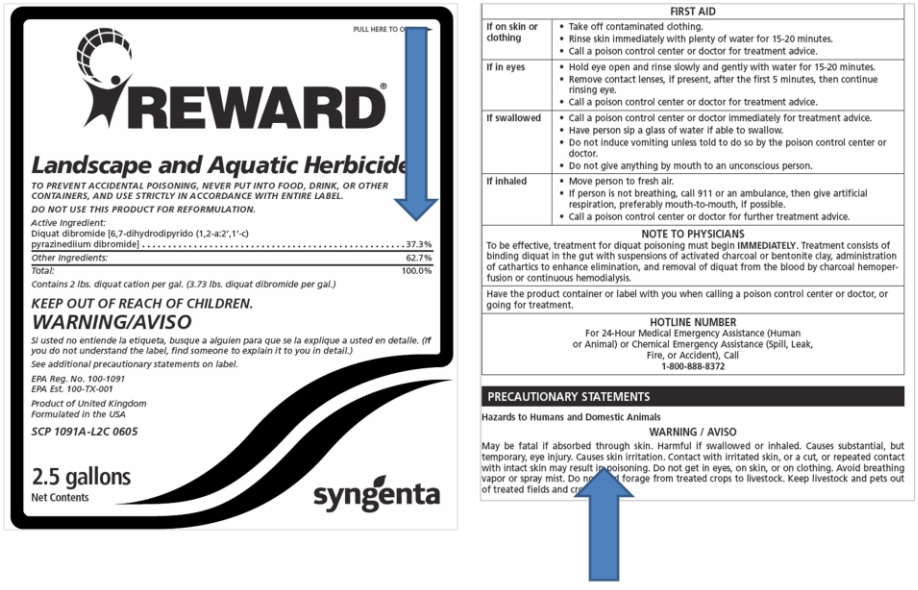
Unit of dose will vary with type of test: ppm or ppb for aquatic toxicity, mg/kg/day for chronic mammal toxicity. The MOE will also vary. Usually 100x for mammalian can be 1000x if differentially toxic to kids, less for ecotox.

Practical issues for pesticide use

- The label is the law
  - Specific precautions on labels are reviewed and required by EPA
  - Application rates are carefully calculated
  - Violations of labels are enforceable under both state and federal law
  - State has enforcement primacy, so complaints and tips should be directed to DEP

DEP pesticide program has inspection and enforcement staff, but limited numbers (4 field 1 office)

Pesticide labels



REWARD®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:
Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c) pyrazinedium dibromide] 37.3%
Other Ingredients: 62.7%
Total: 100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

KEEP OUT OF REACH OF CHILDREN.

WARNING/AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See additional precautionary statements on label.

EPA Reg. No. 100-1091
EPA Est. 100-TX-001

Product of United Kingdom
Formulated in the USA

SCP 1091A-L2C 0605

2.5 gallons
Net Contents

syngenta

FIRST AID	
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.

NOTE TO PHYSICIANS

To be effective, treatment for diquat poisoning must begin **IMMEDIATELY**. Treatment consists of binding diquat in the gut with suspensions of activated charcoal or bentonite clay, administration of cathartics to enhance elimination, and removal of diquat from the blood by charcoal hemoperfusion or continuous hemodialysis.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

HOTLINE NUMBER

For 24-Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accident), Call
1-800-888-8372

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

WARNING / AVISO

May be fatal if absorbed through skin. Harmful if swallowed or inhaled. Causes substantial, but temporary, eye injury. Causes skin irritation. Contact with irritated skin, or a cut, or repeated contact with intact skin may result in poisoning. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or spray mist. Do not [illegible] forage from treated crops to livestock. Keep livestock and pets out of treated fields and cr[illegible]

Note that scary warning statements apply to the pesticide as formulated. When in water in the ppm range the concern is much lessened

Instructions and waiting periods are specific

Reward® Landscape and Aquatic Herbicide

Water Use Restrictions Following Applications With Reward Landscape And Aquatic Herbicide (Days)

Application Rate	Drinking	Fishing and Swimming	Livestock/ Domestic Animals Consumption	Spray Tank Applications** and Irrigation to Turf and Landscape Ornamentals	Spray Tank Applications** and Irrigation to Food Crops and Production Ornamentals
2 gals./surface acre	3 days	0	1 day	3 days	5 days
1 gal./surface acre	2 days	0	1 day	2 days	5 days
0.75 gal. /surface acre	2 days	0	1 day	2 days	5 days
0.50 gal./surface acre	1 day	0	1 day	1 day	5 days
Spot Spray* (< 0.5 gal./surface acre)	1 day	0	1 day	1 day	5 days

*Add a nonionic surfactant (with at least 75% of the constituents active as a spray adjuvant) at the rate recommended by the manufacturer.

**For preparing agricultural sprays for food crops, turf or ornamentals (to prevent phytotoxicity), do not use water treated with Reward Landscape and Aquatic Herbicide before the specified time period.

When the contents of more than one spray tank is necessary to complete a single aquatic application, no water holding restrictions apply between the consecutive spray tanks.

No applications are to be made in areas where commercial processing of fish, resulting in the production of fish protein concentrate or fish meal, is practiced. Before application, coordination and approval of local and/or State authorities must be obtained.

State DEP certification of applicators

- Required for commercial use
  - On property not owned by you or your employer
- Two levels, supervisory and operational
  - Approx. 2700 supervisors, 5400 operators
- Each business requires at least one supervisory level applicator
  - 15 categories, aquatic is most relevant here
  - 35 in aquatic category
  - Approx. 19 aquatic businesses, 5 or 6 most active
- Operators work under supervisor direction
- Each requires passing an examination
  - Supervisory is written and oral – detailed and difficult
  - Operator is basic safety and handling

Why are pesticides used in water?

Curly leaf pondweed in foreground (invasive) spatterdock (native but can be nuisance) in back

Aquatic plants can truly impinge water use

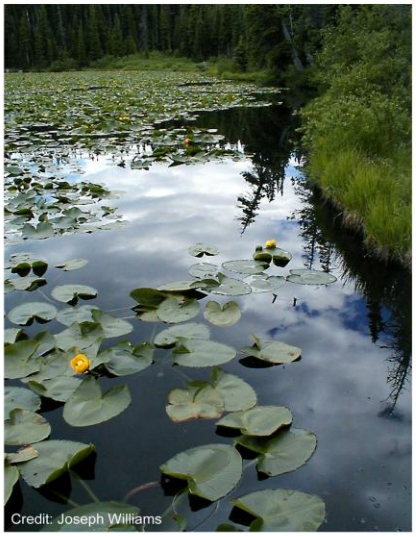
- Recreational (swimming, boating, fishing)
- Biodiversity (invasive plants are biological pollution)
- Health (mosquitoes, toxic algae)
- Aesthetics (includes odor)

Some blue-green algae can produce potent liver toxins

Water Milfoil
(Eurasian and variable)

Curlyleaf Pondweed

Duckweed



Spatterdock
(yellow water lily)

Fanwort & Var. Milfoil

Methods of aquatic weed control

- Mechanical
  - Harvesting temporary, can spread weed fragments
  - Hand pulling can be effective, but for smaller areas
  - Weed barriers – good for small areas but need maintenance
- Biological (Grass carp, insect pests of weeds)
  - May require permits, slow acting, variable effectiveness
- Dredging
  - Long lasting but extremely expensive and disruptive
- Nutrient inactivation
  - Effective for algae, less so for rooted plants
- Chemical
  - Products are tested and specifically labeled for aquatic use

Aquatic weed harvesting

Disposal of weeds is an issue

Algae bloom

Important to distinguish between algae (especially blue-green algae) and macrophytes. The two have very different biology and therefore different strategies of control

Common aquatic algicides

- Copper algicides
  - Copper sulfate
  - Chelated copper (Cutrine, K-TEA, Komeen)
  - Copper carbonate (Captain)
- Hydrogen Peroxide precursor - sodium percarbonate (Green Clean)
- Endothall amine
  - Hydrothal

Copper compounds have zooplankton and aquatic invertebrate toxicity issues, but they are generally short- lived. Copper is an element and hence does not degrade, but it does not stay in the water column for very long. Hydrothal rarely used due to fish toxicity issues.

Water chestnut infestation

This invasive plant has a toehold in CT, mostly along CT river, but in a few ponds elsewhere

Aquatic herbicides

- Diquat (Reward) contact, non-selective, floating and submerged weeds
- Potassium endothall (Aquathol) contact, submerged weeds
- Fluridone (Sonar) systemic, submerged and some floating weeds
- Glyphosate (Rodeo, AquaPro) systemic, emerged weeds

Mention the differences between contact and systemic herbicides

More aquatic herbicides

- Copper carbonate (Nautique) contact, submerged weeds
- 2,4-D (Navigate, Aquakleen) systemic, submerged, some floating weeds
- Triclopyr (Renovate) systemic, submerged weeds
- Imazapyr (Habitat) systemic, emerged weeds

There are a few more new products, but they are not yet in wide use.

How are aquatic herbicides applied?

Note drop hoses off front of boat – inject herbicide directly into water. Airboat sometime necessary to avoid tangling in weeds

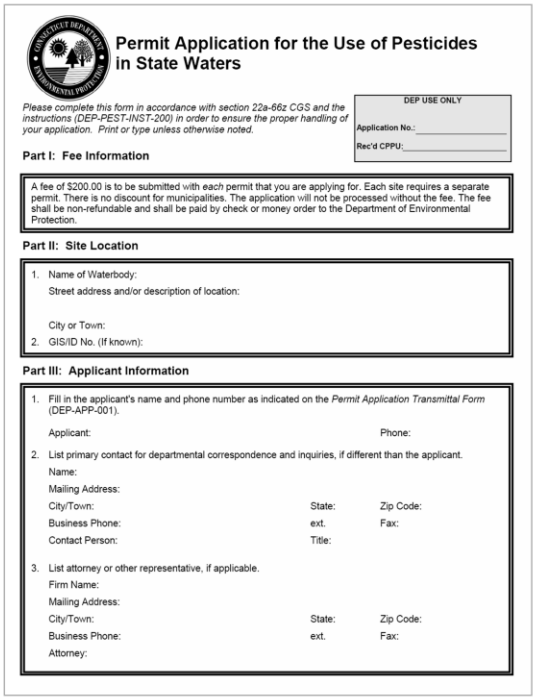
Glyphosate application to phragmites. He probably should be wearing gloves

Aquatic permitting

- Required for chemicals put in state waters to control aquatic organisms
  - Note requirement is for chemicals, not pesticides
  - This means that non-pesticidal chemicals (notably alum) require a permit, but non-chemical pesticides (e.g. *B.t.i.*) do not
- State requirement is beyond that required by federal EPA
  - Many states do have permitting requirements, mostly in northern part of country
  - DEP issues approx. 500 per year
- Individuals may apply and receive permit to treat their own pond
  - No restricted use pesticides allowed
  - Endothall and concentrated diquat are restricted

Aquatic Permit Application

Required for pesticide application to standing water or below high tide mark.



Permit Application for the Use of Pesticides in State Waters

Please complete this form in accordance with section 22a-66z CGS and the instructions (DEP-PEST-INST-200) in order to ensure the proper handling of your application. Print or type unless otherwise noted.

DEP USE ONLY
Application No.:
Rec'd CPPU:

Part I: Fee Information

A fee of $200.00 is to be submitted with *each* permit that you are applying for. Each site requires a separate permit. There is no discount for municipalities. The application will not be processed without the fee. The fee shall be non-refundable and shall be paid by check or money order to the Department of Environmental Protection.

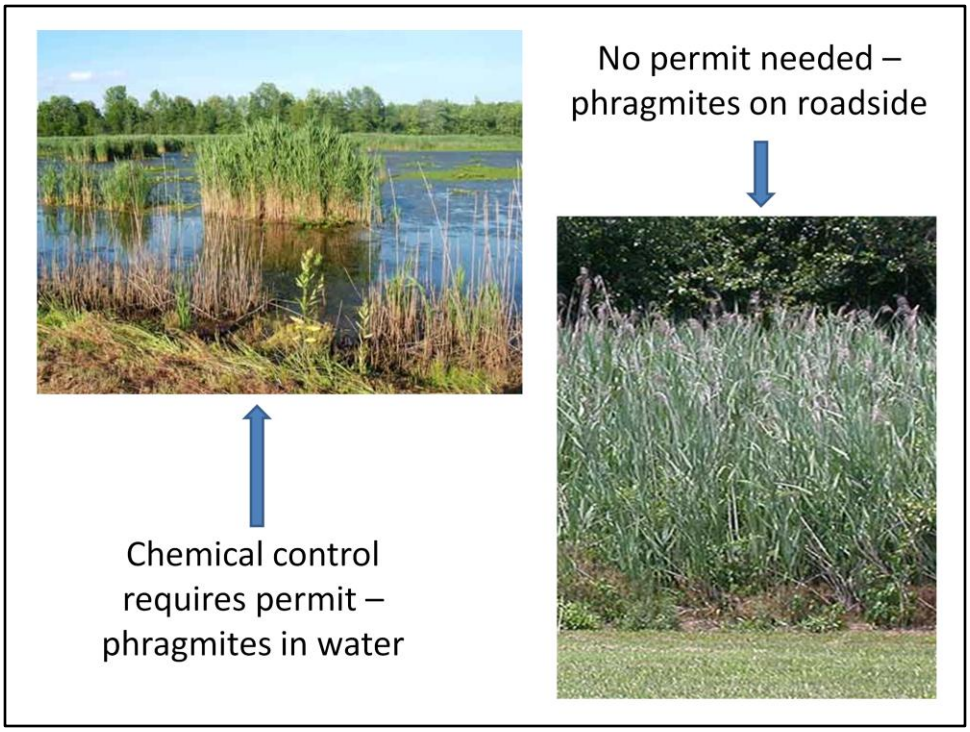
Part II: Site Location

1. Name of Waterbody:
   Street address and/or description of location:
   City or Town:
2. GIS/ID No. (If known):

Part III: Applicant Information

1. Fill in the applicant's name and phone number as indicated on the *Permit Application Transmittal Form* (DEP-APP-001).
   Applicant: Phone:
2. List primary contact for departmental correspondence and inquiries, if different than the applicant.
   Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext. Fax:
   Contact Person: Title:
3. List attorney or other representative, if applicable.
   Firm Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext. Fax:
   Attorney:

Note that application of pesticides is to watercourses, not all wetlands



Even though the roadside area may be a wetland as defined by soil, the permit requirement is for application to standing water.

What are we looking for on the application?

- Where, what, who and how?
  - Location, pest, chemical, applicator, size of pond, quantity of herbicide, uses of water, types of fish
- In drinking water watershed or are wells nearby?
- Rare species involved?

Photo on right is rare species water marigold. Photo on left has both invasive (right) and rare (left) species of milfoil.

Role of municipal IWC

- Statutes (22a-54) give exclusive regulatory authority over pesticide application to DEP
- Most wetland/watercourse permitting is delegated to towns
- State issues pesticide permits
  - Requires applicant notice to local IWC – proof submitted with permit package
- Towns may comment, but not deny state permit
  - Info sought is what might not be on application, e.g. other water uses, conservation easement

DEP will not wait for comments unless alerted by the IWC

Can the IWC require a wetlands/watercourse permit?

- Yes, but considered optional by CTDEP Wetlands Management Section
- Focus needs to be on the modification of the watercourse, not the pesticide
  - State has expertise on chemicals
  - Locals have expertise on value of vegetation in pond
  - Requirements on permit should be independent of method of control
- This distinction has not been tested in court

This is the heart of the presentation

Problems from pesticide applications in or near water

This actually does not happen very often

- Fish/wildlife kills uncommon
- Most fish kills are related to dissolved oxygen depletion
  - Rotting weeds rob the water of oxygen – especially at night when photosynthesis stops
- Fish also can die from post-spawning stress
  - Tend to be all one species
- Runoff from terrestrial applications possible, but not common
  - Usually from organophosphorus insecticides
  - Pesticides with high fish toxicity may have setback from water
- Bird kills rare since diazinon off market

The most significant effect from herbicide application is usually that which was intended

Dead plants – especially on shore or emergent from water – can draw public attention. In some cases pond owners have unrealistic expectations for vegetation free water. This is neither desirable or achievable.

Summary

- Pesticides are regulated at federal and state level
  - The term is generic and covers a very wide variety of substances
  - There are big differences in hazards to humans and the environment
- Pesticides are sometimes the most environmentally friendly way to deal with aquatic vegetation
  - Invasive plants are a significant problem

Summary - continued

- Aquatic pesticide application regulated at state level
- Wetland regulation usually at local level
  - Local regulation should not deal with pesticide hazard issues
- Changes coming in national regulation of aquatic applications
  - Connecticut should be less affected than some
- Environmental damage from aquatic applications rare

"A weed is a plant whose virtues have yet to be discovered" Emerson

Invasive weeds don't have many virtues.

Questions?

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