Arboriculture 101
March 3, 2021

Pesticide Safety

THE Core Manual – A self-study guide

- 1 Pest Management
- 2 Federal Pesticide Laws/Regs
- 3 Pesticide Labels/Labeling
- 4 Pesticide Formulations
- 5 Pesticide Hazards/First-Aid
- PPE
- Pesticides In the Environment
- Transportation/Security/Storage
- Emergency/Incident Response
- Planning the Application
- Pesticide Application Procedures
- Appendices

What Types of Pesticide Applications for Arborists-Trees?

Spraying tall trees

"uniform coverage," "spray to wet," other

Hydraulic-big gun sprayer

B&G sprayer

Backpack mistblower

Soil injection

Trunk Injection
Soil application, granular

Calibrate equipment

Label will dictate how much to apply per tree, how much per diameter of tree trunk, soil

Foliar, trunk, branch

Systemic basal bark spray

Systemic injection

Bark drench

Treatments may have to comply with label limits regarding max amount/acre/year

What pesticides do arborists use?
(some examples, not intended to be any endorsement of the products mentioned. Check CT Registration status and label before use)

OP- Orthene/acephate

Carbamate-Sevin/Carbaryl

Daconil/chlorathalonil

Pyrethroid-Astro/permethrin, Onyx/Bifenthrin, Deltamethrin, many others

Neonicotinoid-Imidacloprid, Safari/Dinotefuran, Acetamiprid

Horticultural oil, insecticidal soaps, BT, Neem/azadiractin, Avid/abamectin

Soil drench/injection-

Merit, Safari, Transtect, Zylam, Xytect

Systemic basal bark spray-

Safari TM, Trastect, Zylam,

Trunk Injection-

Azasol (azadiractin), Arbormectin (Emane ctin benzoate), Imicide, Tree-Age,TreeAzin,

Trunk/Branch/Foliar-

Astro(permethrin), Onxy (Bifenthrin), Tempo (Cyflothrin) Sevin SL (Carbaryl)

"Stupid Is" as "Stupid Does"

Some People do stupid things with pesticides and other chemicals (see next slide)

Two rules of thumb regarding pesticide use

1. It's the dose that makes the poison
2. Always read the label prior to use. Always follow the label

It is a violation of law to use a pesticide in a manner inconsistent with its labeling.

Toxicity of pesticides
toxic means harmful, poisonous

Toxicity is the natural capacity of a substance to produce an injury.

Toxicity is always relative to dosage.

Dosage- It's the dose that makes the poison, or the dose over time.

Acute vs Chronic toxicity

Toxicity of pesticides
Measuring Toxicity

-Acute toxicity is determined primarily from animal studies (newer cellular studies)

-LD50

-Signal words on labels are based on LD50 studies.

-See Toxicity Categories chart in CORE manual Chapter 5, page 76

-What about chronic toxicity? Some discussion on label, SDS, other sources, CORE Chapter 5

Toxicity of pesticides
How Can Pesticides Enter the Body?

Dermal-skin

Inhalation-Breathing it in

Oral- Swallowing

What is the most common way pesticides can enter the user's body?

What individual characteristics of the individual can influence their exposure?

Toxicity of pesticides
What are symptoms of exposure?

Mild,early acute poisoning

Headache, fatigue, weakness, dizziness, restlessness, nervousness, perspiration, nausea, diarrhea, loss of appetite, loss of weight, thirst, moodiness, soreness in joints, skin irritation, eye irritation, irritation of the nose and throat.

Toxicity of pesticides
What are symptoms of moderate acute exposure?

Nausea, diarrhea, excessive saliva, stomach cramps, excessive perspiration, trembling, no muscle coordination, muscle twitches, extreme weakness, mental confusion, blurred vision, difficulty in breathing, cough, rapid pulse, flushed or yellow skin, weeping.

Toxicity of pesticides
What are symptoms severe acute pesticide poisoning?

Fever, intense thirst, increased rate of breathing, vomiting, uncontrolled muscle twitches, pinpoint pupils, convulsions, inability to breathe, unconsiousness.

...potential death

Reference Guide-Recognition and Management of Pesticide Poisoning

https://www.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings

What happens to pesticide chemicals if they enter our bodies?

- Intake, uptake, distribution and fate of chemicals:
  - Metabolism
  - Storage
  - Excretion
  - Toxic effect

Most toxic effects are reversable

If symptoms are present, need to put 2 + 2 together, that is symptoms and history of the exposure

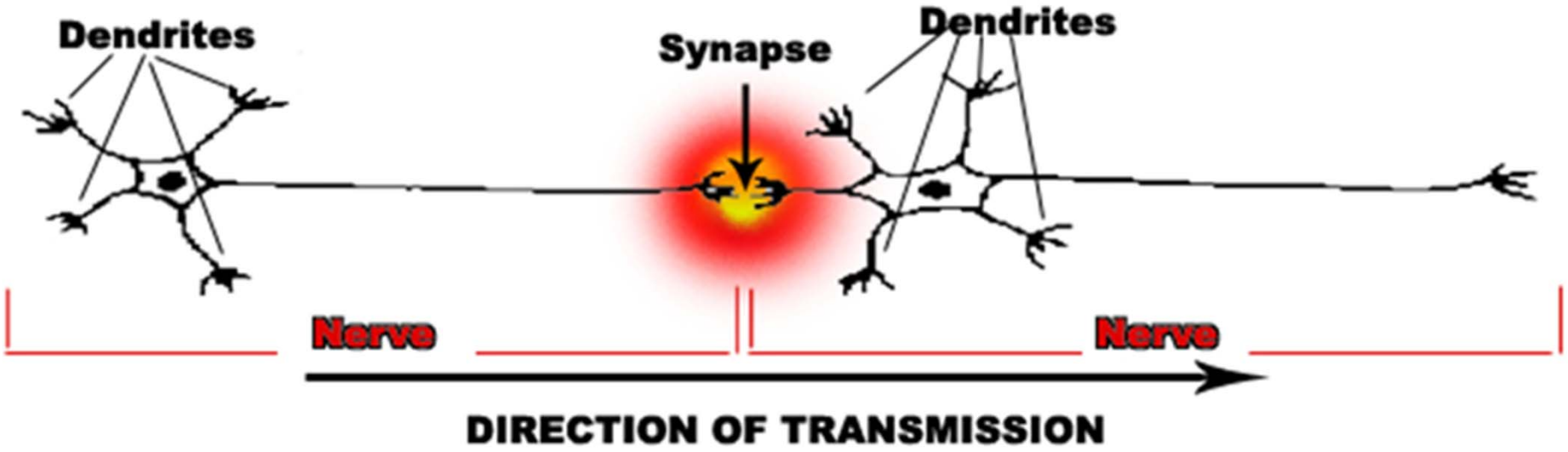
Unknown factors

Some pesticides work on the nervous system and cause Cholinesterase inhibition.

-OP and Carbamate insecticides kill insects by interfering with or "inhibiting" the function of Cholinesterase, an enzyme of the nervous system.

-These pesticides act on the nervous systems of humans and other vertebrates if exposed to a toxic dose from a single exposure or repeated small doses.

-Cholinesterase levels can be monitored in the blood. A lower level than normal level indicates exposure.


Dendrites
Synapse
Dendrites
Nerve
Nerve
DIRECTION OF TRANSMISSION

What are hazards associated with pesticide use?

-Hazard is the potential for injury to you, the applicator, others, or the environment

Hazard factors:

-toxicity of the substance

-Site to treat

Formulation (ex. dust, EC emulsifiable conc., WP wettable powder, liquid injection, G granular)

-concentration, dosage

-chemical class of the pesticide

-skill of the applicator

-other hazards

Personal Protection Equipment PPE

- Pesticides are absorbed rapidly when you are exposed to them.
- Some parts of the body absorb pesticides more rapidly.

Click to add text

Always avoid contact with pesticides

- Check the pesticide label for proper PPE

Personal Protection Equipment PPE

Gloves

Body Coverings

Goggles and/or face shield

Head and neck coverings

Apron for mixing/loading

Respirators-always use if required on the label,and depending on inhalation hazards during daily or lengthy exposures.

Personal Protection Equipment PPE

Make sure you are wearing what the label requires you to wear.

Some pesticide products require more PPE for mixing, filling and loading activities.

If you are the applicator, make sure you have access to the label that is from the actual container of pesticide product you are using.

Specimen "labels" may not have the same information.

What are respirator hazards that a pesticide applicator might encounter?

- **DUSTS:** Solids broken down into fine airborne particles.
- F**UM**ES: Solids vaporized under high heat and condensed into very fine particles.
- **MISTS:** Liquids atomized and condensed.
- **GASES**: Vaporous substances that can spread freely throughout an area.
- **VAPORS:** Gaseous state of substances that are liquids or solids at room temperatures and evaporate easily.

What type of respirator to use?

This information will be described on the label.

Most, Commonly used pesticide products do not require the use of a respirator for mixing/loading or spraying.

Labels should list the NIOSH TC approval number plus describe the respirator approved for the use of the product.

Air- purifying respirators

-Filters (for particulates)

-Cartridges (for gases or vapors)

-Known chemical substance

-Oxygen must be at >19.5%

What is the difference betrween a particulate filter and a chemical cartridge?

Filters---can trap particles like dusts, mists, fumes, but cannot protect against gases, vapors or low O_2 (

(Applies to disposable type masks which are particulate respirators, filters, or respirator pre-filters.)

Chemical cartridges --- use sorbents such as activated charcoal to remove gases or vapors and are designed for specific contaminants or classes of chemicals.

Types of Respirator Filters

- 3 levels of filter efficiency:
  --95% (called "95") used for most applications
  --99% (called "99")
  --99.97% (called "100") replaces HEPA

3 categories of resistance to filter efficience degradation:

--N (*N*ot resistant to oil)

--R (*R*esistant to oil)

--P (oil *P*roof)

Chemical Cartridge Color Coding

Acid Gas---White

Organic Vapors---Black

Ammonia Gas---Green

Acid Gas and Organic Vapor—Yellow

Multi-Gas (protects against numerous gases and vapors)--Olive Green

Particulate Filter Cartridge (P100)--Magenta

Exposure assessment

- Does the label require a specific respirator?
- Identify airborne contaminants if possible
- Match up specifications and limitations of respirators
- Consider abnormal conditions that may cause concentrations to rise (for example: use indoors vs outdoors).
- Think in terms of "worst case" exposures
- Apply substance-specific requirements.
- Communicate with employees; discuss signs and symptoms of over-exposure
- Keep Records. Follow OSHA Respiratory Standard.

Always use pesticides safely and in a manner consistent with the label.

Christina Berger

Environmental Analyst II
Pesticides Management Program

Department of Energy and Environmental Protection

79 Elm Street Hartford CT 06106

Christina.Berger@ct.gov

Favorite Pesticide Websites

- https://pesticidestewardship.org -really good "companion" to the core manual and for future reference. Good common sense explanations for applicators and lots of links. Up to date on environmental topics. Test your knowledge with the free quizes.

- https://www.nasda.org/foundation/pesticide-applicator-certification-and-training A "Free" Core Manual itself. A self-study national core manual, has quizes and answers to them. Available from CTPA in book form.
- http://npic.orst.edu/ A national database for pesticide scientific and basic information. Plenty of links, and you can contact them with questions.
- https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1 The Pesticide Product Label System. Look up the officail basic registrant pesticide label that was approved by EPA.
- https://www.epa.gov/pesticides The EPA Pesticide Program website. If you really want to delve into the world of pesticides regulation. This is where it all begins. Sign up for news alerts.

The Pesticide Quiz Challenge!

- https://pesticidestewardship.org/ipm/
- Study the following sections at the website and take the quizes
- Drift, Quiz 1 and Quiz 2
- IPM, Quiz
- Surface and Groundwater, Water Education Quiz Module
- Wildlife Protection, Quiz 1 and Quiz 2
- Rate your skills 1-10 (10 being highest level)
  - Did you increase your knowledge of the topic? (1-10)
  - How did you do on each quiz? They are not easy. (1-10)

  BONUS QUESTIONS:
  - As a pesticide applicator could you confidently discuss the many factors that contribute to drift and how to manage them?
  - Could you explain the different components of an IPM plan you would use for a client property (trees)?
  - Could you explain how to protect groundwater/surface water from pesticide contamination at mixing/loading or pesticide storage sites?
  - Are pesticide applicators non-target organisms?