

# **How to make IPM work**

Understanding Integrated Pest  
Management



**IPM is the first step towards an environmentally friendly garden**

IPM practices naturally lead to  
**Plant Health Care (PHC)**

# PHC incorporates these gardening principals

- Proper soil preparation, using quality composted products
- Planting the right plant in the right place
- Proper aftercare of the garden, including:
  - Proper watering
  - Mulching and weed management
  - Fertilizing
  - Pruning
  - Proper mowing habits
  - Thinking twice before using any pesticides

# The Benefits of Gardening with Environmental Practices

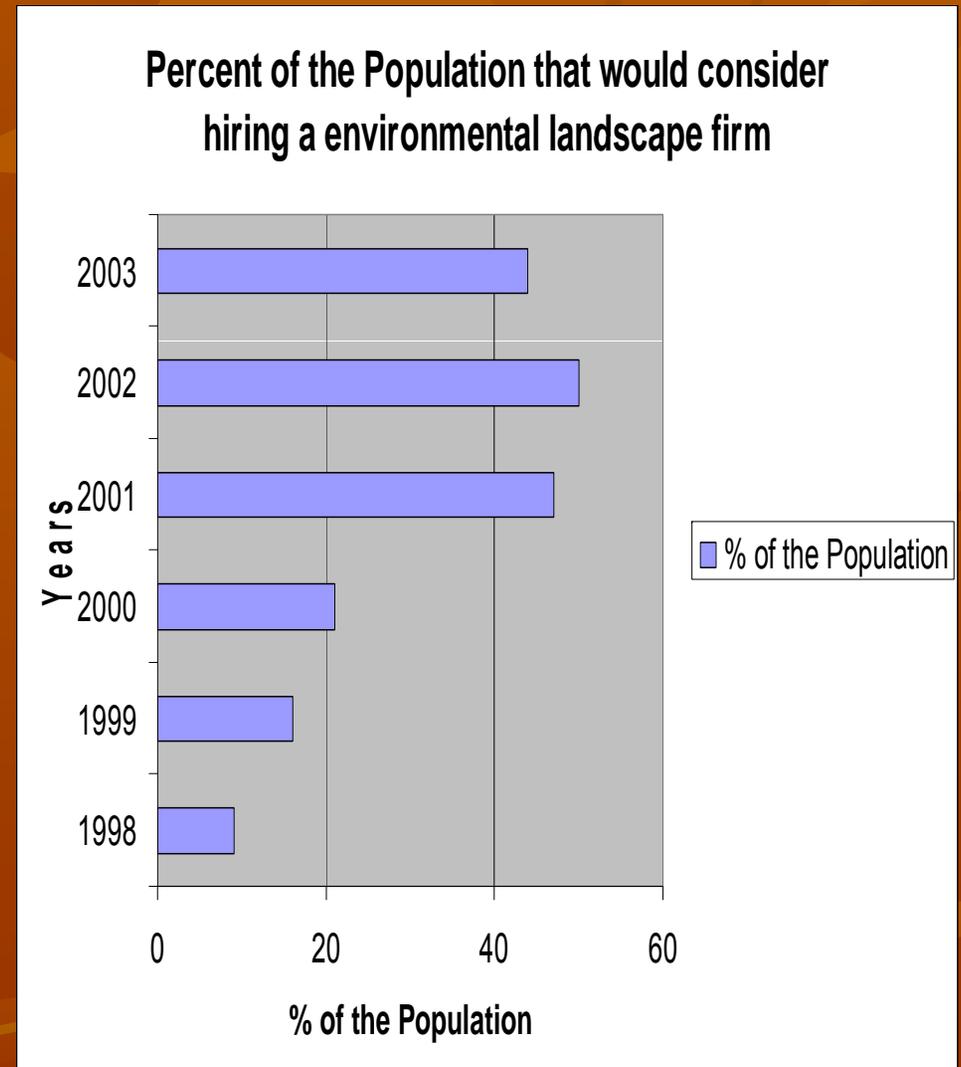
- Stronger, Healthier Stands of Plants
- Reduced disease outbreaks
- Reduced insect/mite damage
- Reduced numbers of weeds
- Better water retention and percolation in soils
- Less soil damage, restores and enhances soil life
- Lower impact on all our natural resources: Air, Water, Wildlife

## **The even better benefits from using Environmental Practices:**

- Lockhaven Condominiums in Seattle: The Birds are Back!!
- Kirkland Waterfront Home: More butterflies then ever before!!
- Peace of Mind

# The Market Place

- LOHAS
- Lifestyle of Health & Sustainability
- 25-30% of the market wants to buy according to LOHAS
- Willing to pay up to 20% more
- Soundstats survey of consumers wanting to hire an environmental landscape service- 1998 was 9%, rose to 44% in 2003



# Why is the marketplace changing?

- Concerns for the health of our families and pets
- Concerns over our impacts on waterways and Salmon
- We are learning even more about the value of water and how it pertains to its availability for use, how we use it and how we can channel it when we get too much
- We are understanding that it is our responsibility to take care of our landscapes in an environmentally sound manner to ensure that resources are maximized and our impact minimized

Let's talk about soil

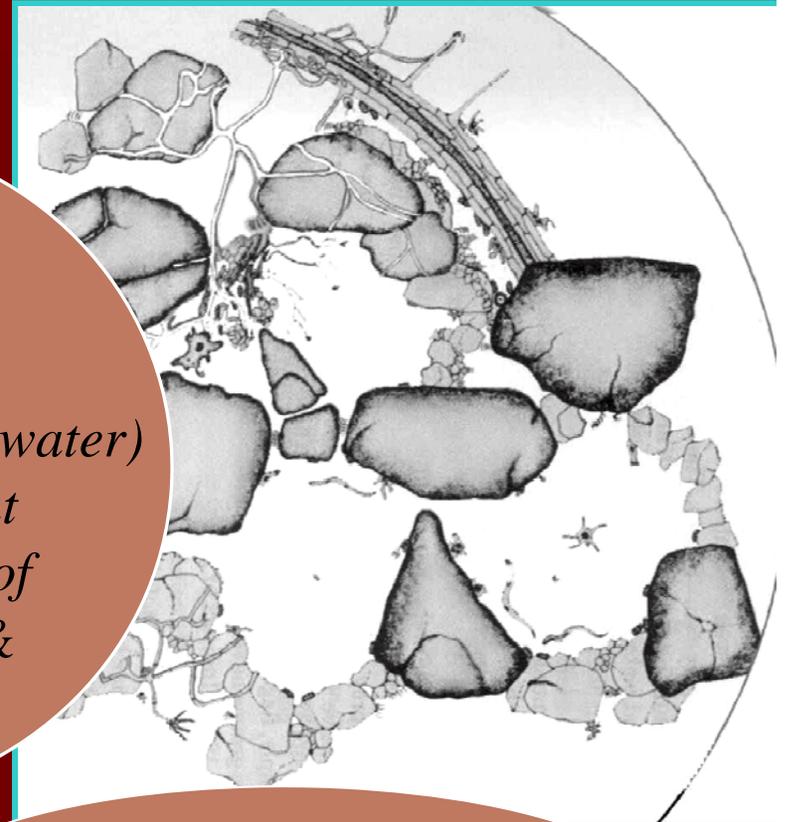
# We all need a better understanding about soil: Texture, Structure, & Pore Space (thus infiltration)

## Soil components:

- "The Dirt"  
(mineral part)
  - sand
  - silt
  - clay
- Air and Water
- Organic Matter  
and Soil Life  
(create aggregates & pores)

*Good soil is about*  
*- half mineral*  
*- half space (air & water)*  
*- plus a smaller but*  
*essential amount of*  
*organic matter &*  
*soil life*

*"Loam" is a mix of*  
*sand, silt, clay and organic,*  
*formed over time by nature*

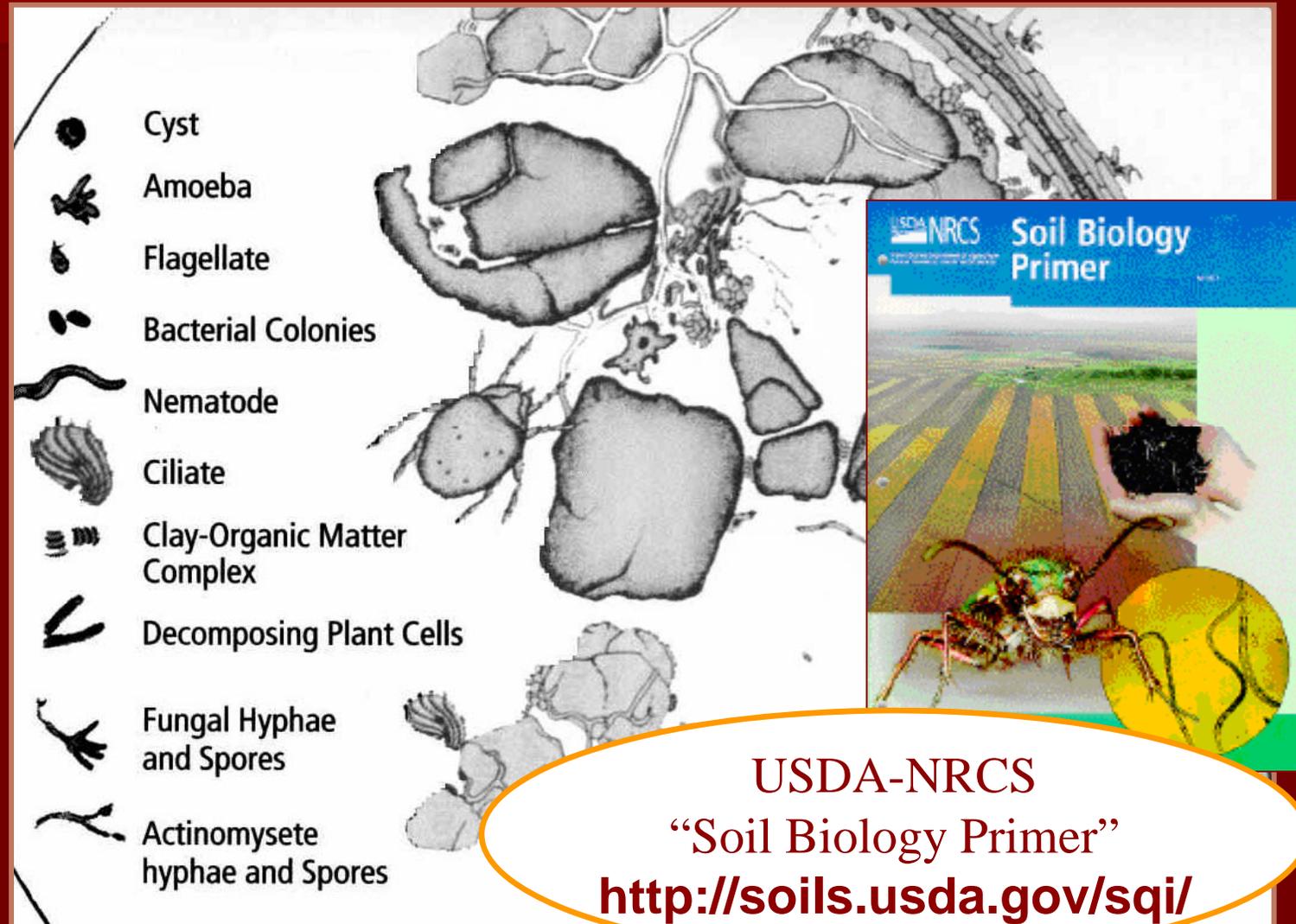




# Understanding Soil Biology

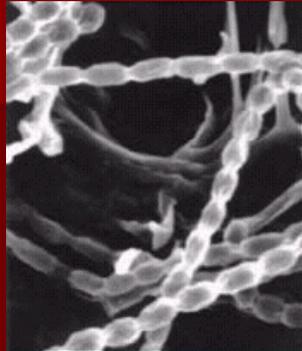
*Soil life provides essential functions*

Soil  
is  
alive!



# Common organisms in the soil foodweb

## ■ Bacteria



Paul R. August, University of Minn.

## ■ Nematodes



Soil Foodweb Inc.

## ■ Fungi



Soil Foodweb Inc.



## ■ Arthropods



SSSA

## ■ Protozoa



Wilhelm Foissner,  
University of Salzburg

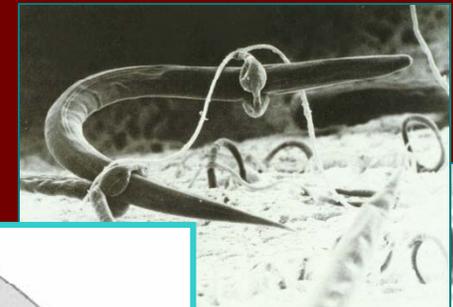
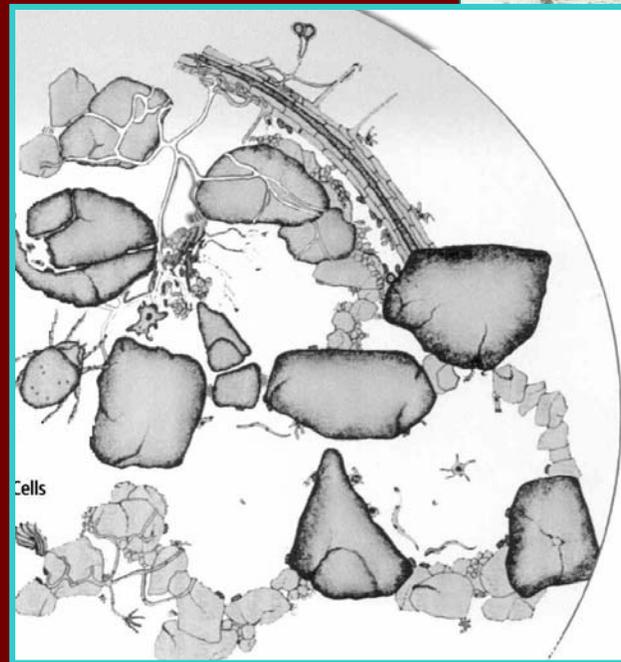
## ■ Earthworms



# Restoring soil life, to restore soil functions

Soil organisms create:

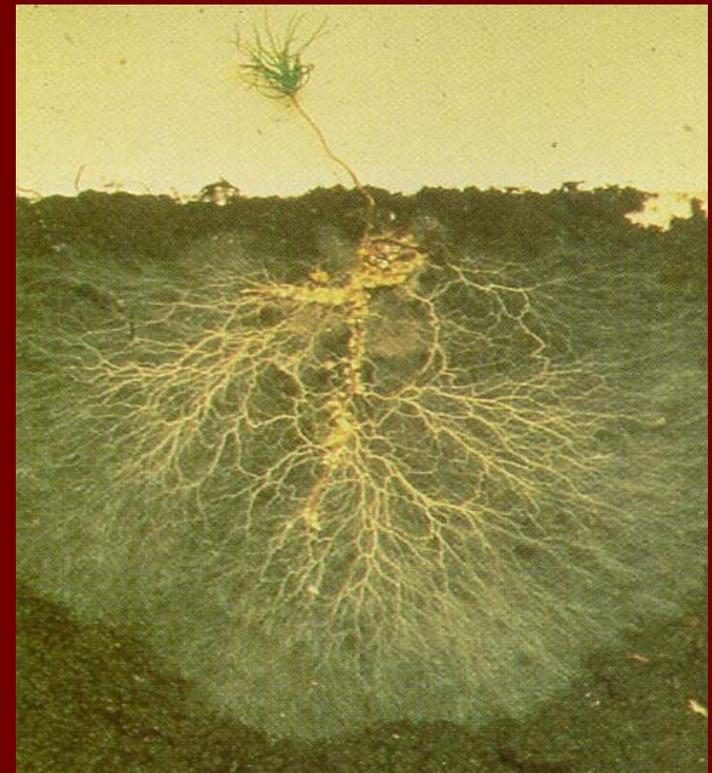
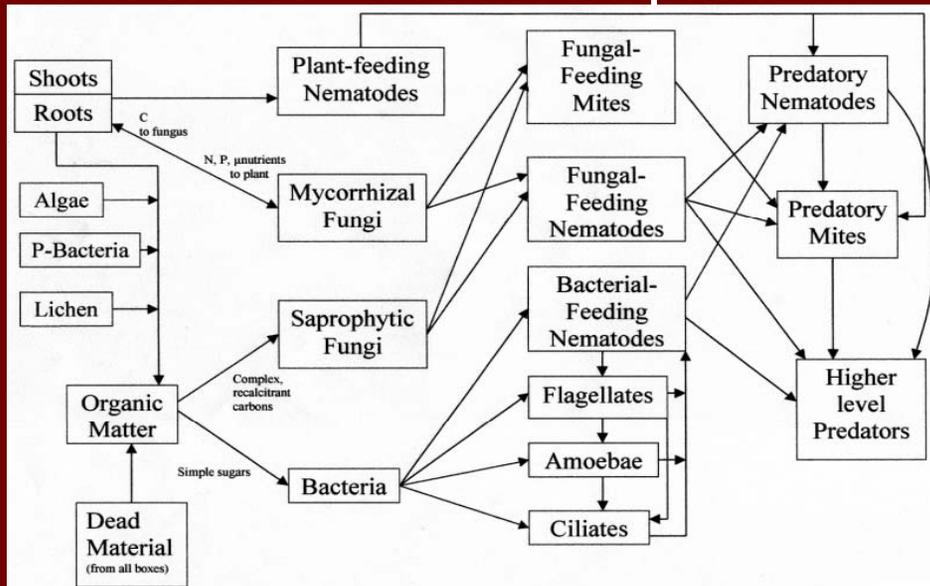
- soil structure
- fertility = nutrient cycling
- plant disease protection
- biofiltration
- erosion control
- stormwater detention



**Compost kickstarts the soil ecosystem!**  
(Provides food and home for organisms)

# How does soil life provide fertility (nutrient cycling)?

- Soil foodweb stores nutrients in living & dead organic matter
- Nutrients are released in root zone as organisms eat and excrete "waste" (nitrogen, etc.)
- Mycorrhizal fungi bring nutrients and water to roots of plants



**“Worms are the intestines of the soil. All life, including ours, depends on their patient tilling.”**

**-Darwin**



# Pop Quiz

- ▶ How many bacteria can be found in 1 teaspoon of *healthy* soil?
  - 4,000
  - 40,000
  - 400,000
  - 4,000,000
  - 40,000,000

4,000,000,000



# Pesticide effects on soil life

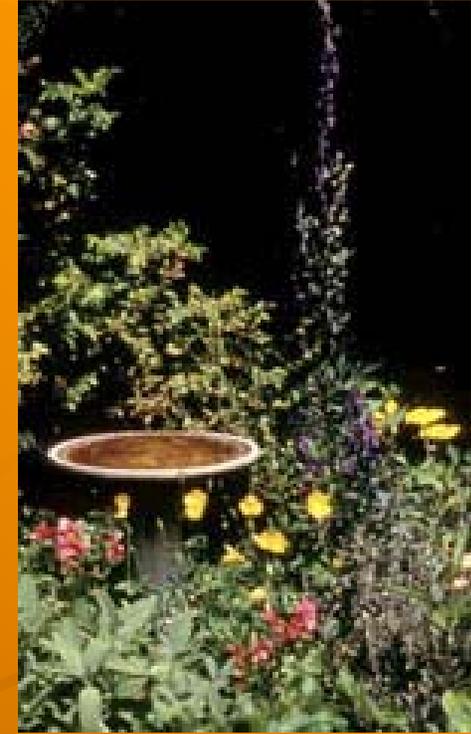
- Studies show that regular use of herbicides, fungicides, and insecticides decreases numbers and diversity of beneficial soil life, from earthworms down to bacteria and fungi
- In studies, increasing pesticide and soluble fertilizer use correlated with increasing soil compaction, soil acidification, decreased percolation and water infiltration capabilities

# How to get started: Basics of Natural Pest Control



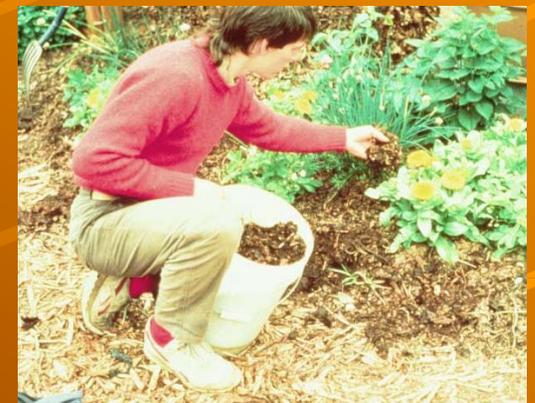
# Natural Pest Control

- **Create a healthy garden** - healthy plants resist most pests and diseases, and out-compete weeds
- **Identify pests** before you spray, stomp, or squash
- **Give nature a chance to work** - tolerate a little damage; get to know the beneficial bugs that often take care of many pests
- **Use the least toxic pest controls available**



# Step 1. Prevent problems by creating a healthy garden!

- ◆ **Build Healthy Soil** by digging in compost, and mulching after planting
- ◆ **Planting the right plant in the right place**-consider plant needs, diversity. Select pest and disease resistant varieties
- ◆ **Mulch and Water Wisely** by maintaining mulch out beyond reach of branches, and watering through 2 or 3 summers to get established
- ◆ Proper fertilization and mineral replenishment
- ◆ Minimize pest habitat



# Build Healthy Soil

**WHEN** Before planting lawns, annuals, perennials, trees and shrubs.

**HOW** Use shovel or fork, or rototill large areas. Build berms of quality composted soils

**TRY** dry gardening with gravel and compost mulch



# Healthy plants grow on healthy soil.

Feed soils with organic amendments like compost to:

- Keep soil loose and fertile
- Help prevent plant disease
- Store water and nutrients in plant root zone

Soils without compost

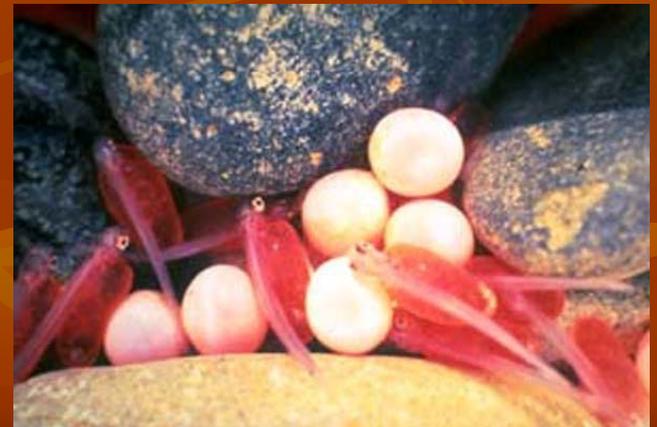


With compost amendment



## Healthy soils are good for the environment too!

- Allow rainwater to infiltrate, slowing runoff that erodes streams
- Reduce need for fertilizers and pesticides, which can harm stream life when they wash off
- Reduce irrigation needs, so we can leave more in the rivers for fish (and save money on bills too!)
- Filter out urban pollutants (from cars and landscape chemicals)



## Step 2

### **Yikes! There is a pest problem!**

- Look carefully:
  - What is the damage?
  - Is it getting worse?
  - Are insects or disease signs visible?
  - Is what you are seeing really a pest?

# Step 3

## What is the cause?

- Drought Stress?
- Nutrient Deficiency?
- Unhealthy plant?
- Insects or disease?
- Poor soil conditions?
- Too much Water-not enough?
- Wrong plant in the wrong place?
- Poor pruning or planting?



## Step 4

### What can you do about it?

Stressed Plant? See Step 1: Good soils and mulch

The right plant in the right place

Proper care of the garden, including:

- Proper watering
- Proper mulching and weeding
- Proper fertilizing
- Proper pruning and mowing
- Minimizing the pest habitat

# *What steps should I take?*



Washing Aphids



Copper slug barrier



Torches work on weeds  
in cracks or gravel



Spreading mulch to prevent weeds



Protecting a crop with a  
floating row cover

The background of the slide is a solid brown color with a pattern of faint, overlapping autumn leaves in various shades of brown and tan. The leaves are scattered across the entire area, creating a textured, naturalistic feel.

All Pest management  
Use the least-toxic  
controls available!!

# If a Pest Problem Develops...

Use Physical Controls First:

- Removal
- Traps
- Barriers
- Repellants
- Weed burners for weeds



Copper slug barrier



Washing Aphids



Protecting a crop with a floating row cover

# Meet the Beneficials!

Biological controls include encouraging the beneficial organisms



Mealy bug destroyer



Green lacewing



Rove beetle



Ladybug larva,  
eating aphids

# Use the least toxic controls

- Soaps
- Horticultural oils
- Neem oils and hot pepper sprays
- Selective spot sprays

# Think twice before using toxic pesticides!!





## Pesticides Detected in Urban Streams During Rainstorms and Relations to Retail Sales of Pesticides in King County, Washington

According to studies conducted in the Puget Sound Basin from 1987 to 1995 and summarized by Bortleson and Davis (1997), more types of pesticides were detected in urban streams than in agricultural streams. As well, in the Puget Sound Basin, more pounds of pesticides were applied in urban than in agricultural areas (Tetra Tech Incorporated, 1988). To provide some insight about sources of pesticides found in urban streams, the U.S. Geological Survey (USGS), the Washington State Department of Ecology, and King County collaborated to study and compare types of pesticides found in urban stream water with pesticide sales information from large home and garden stores.

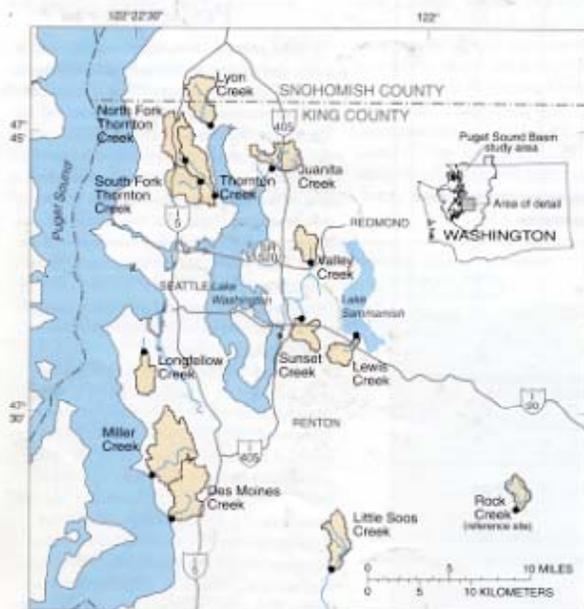


Figure 1. Location of sampling sites within watersheds.

### Study Design

The study was designed to detect the largest number of pesticides likely to be transported in surface runoff to urban streams. Sampling occurred when pesticide applications to residential areas were high and when transport of pesticides to surface water would be likely. Sampling was conducted in April and May because data from home and garden stores indicate that pesticide application rates are higher in April and May than in any other months during the year.

Sampling was conducted during storms because previous sampling at Thornton Creek by the USGS showed that pesticide runoff is greatest during storms. Pesticides are not only more likely to be found during storms, but the concentrations of the pesticides found are also more likely to be of ecological concern.

From two to four surface-water samples were collected at each of 12 study sites in 10 urban or suburban watersheds in King County (fig. 1). Rock Creek, in an undeveloped basin, was sampled as a reference site.

### Findings

Twenty-three pesticides were detected in water from urban streams during rainstorms, and the concentrations of five of these pesticides exceeded limits set to protect aquatic life.

During rainstorms, 23 of 98 pesticides sampled for were detected in water samples from 12 study sites in 10 urban watersheds. Concentrations of five insecticides exceeded recommended maximum concentrations set by the National Academy of Sciences and National Academy of Engineering (NAS/NAE) (1973). In a few samples, concentrations of Diazinon, carbaryl, and Lindane exceeded U.S. Environmental Protection Agency (USEPA) and other chronic aquatic-life criteria.

Pesticides used on lawns and gardens contribute to the occurrence of several pesticides in urban streams.

According to 1997 sales data from home and garden stores, of the pesticides sampled for, Diazinon, 2,4-D, and MCPP are the most frequently purchased pesticides by residents of King County. MCPP and 2,4-D are also among those pesticides used by professional applicators for pest control in residential, recreational, and industrial areas. The presence of these pesticides in water samples from all of the 12 study sites shows that their widespread application impacts water quality in urban streams. Also, residents purchased and applied four of the five pesticides that exceeded recommended maximum concentrations set by the NAS/NAE (Diazinon, carbaryl, Malathion, and chlorpyrifos).

Many pesticides found in urban streams might be the result of nonresidential applications.

Almost half of the 23 pesticides detected in stream water had no retail sales according to a 1997 survey of pesticides sales from home and garden stores in King County. Two of these pesticides (atrazine and simazine) were found at more than 60 percent of the study sites. This indicates that these pesticides are being applied to nonresidential areas in urban watersheds such as rights-of-way, parks, and recreational areas.

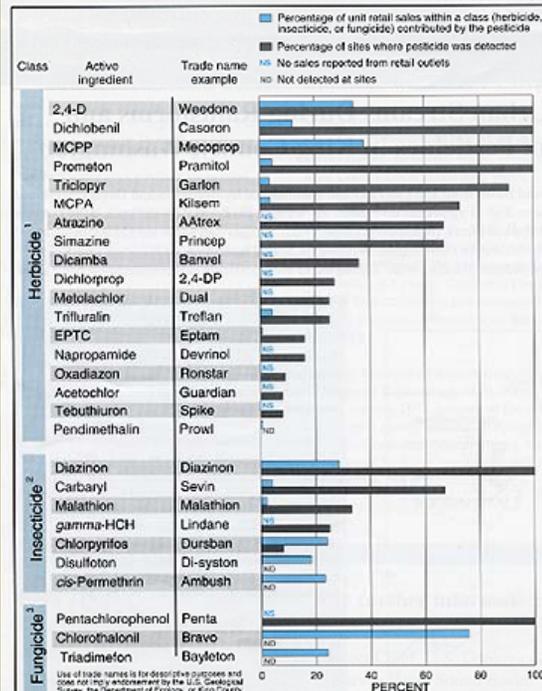


Figure 2. Percentage of unit retail sales in each pesticide class contributed by each pesticide and percentage of sites where pesticide was detected. Sales data for pesticides not analyzed for are not included.

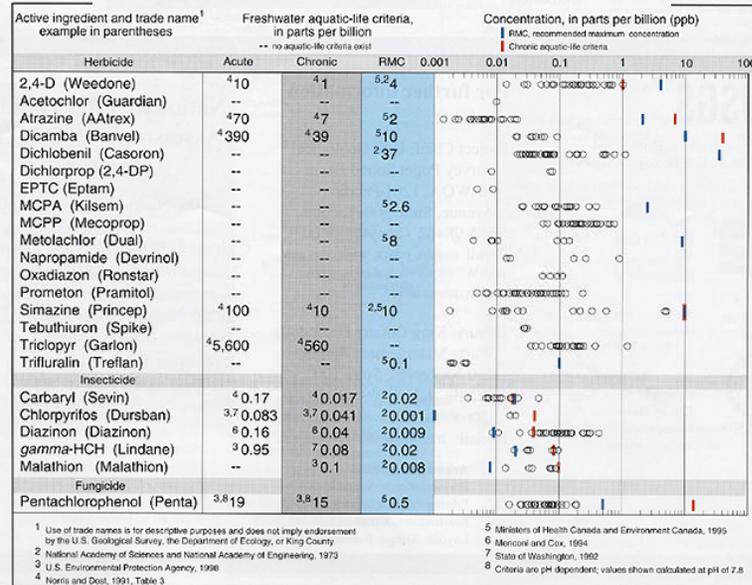


Figure 3. Concentrations of pesticides detected in water and aquatic-life criteria.

# The Next Steps

## Step 5

- How well did your control method work?

## Step 6

- How can I prevent future problems?
- Soil, water, plant, aftercare?

*Go back to Step 1-  
Create a healthy  
Garden*

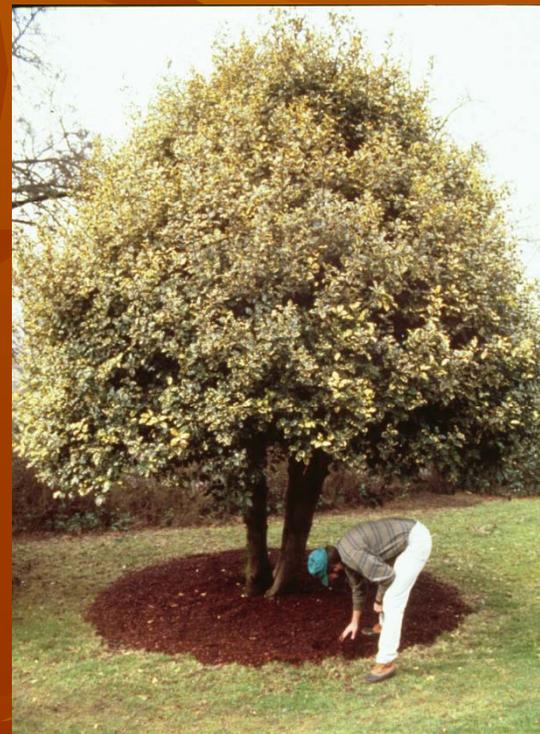
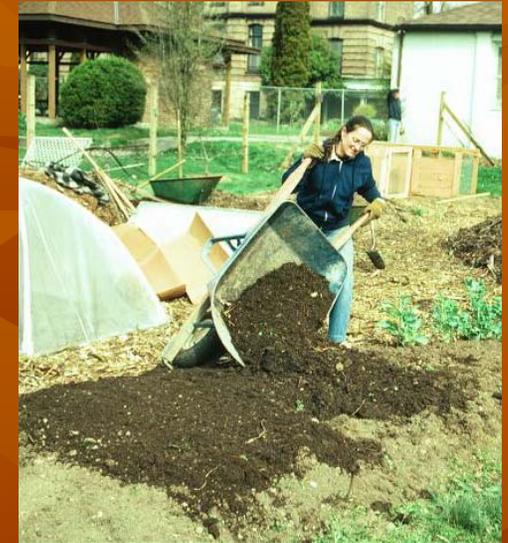


*Sun*

*Shade*



# Make these practices your goal!



# A natural solution - for healthier streams, and healthier landscapes

- ⌞ Conserve existing soils and vegetation where possible.
- ⌞ Restore natural functions in disturbed soils by reducing compaction and using organic amendments.

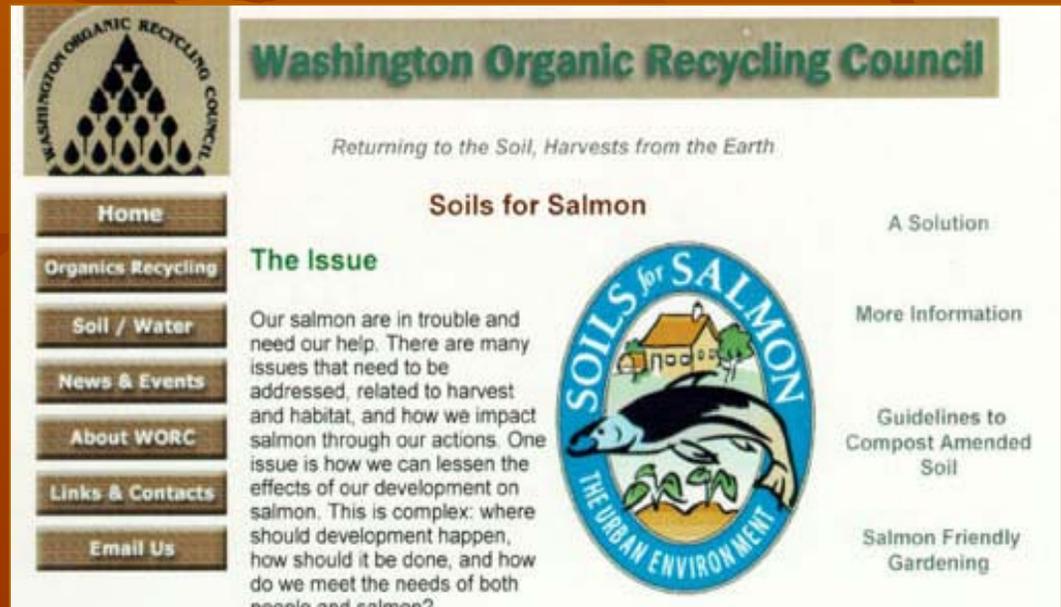


more information:

Washington Organic  
Recycling Council

at

[www.SoilsforSalmon.org](http://www.SoilsforSalmon.org)



The screenshot shows the website for the Washington Organic Recycling Council (WORC). The header includes the WORC logo and the text "Washington Organic Recycling Council" and "Returning to the Soil, Harvests from the Earth". The main heading is "Soils for Salmon". A navigation menu on the left includes links for Home, Organics Recycling, Soil / Water, News & Events, About WORC, Links & Contacts, and Email Us. The main content area features a section titled "The Issue" with a paragraph of text: "Our salmon are in trouble and need our help. There are many issues that need to be addressed, related to harvest and habitat, and how we impact salmon through our actions. One issue is how we can lessen the effects of our development on salmon. This is complex: where should development happen, how should it be done, and how do we meet the needs of both people and salmon?". To the right of the text is a circular logo for "SOILS for SALMON THE URBAN ENVIRONMENT" featuring a house, a tree, and a salmon. Further right is a list of links: "A Solution", "More information", "Guidelines to Compost Amended Soil", and "Salmon Friendly Gardening".

# Aerobic Gardening

- 300 to 600 calories per hour are burned gardening
- Light exercise: Pruning, raking and gathering fallen branches and debris
- Try moving 5 yards of mulch in a day
- Try reading :”Fitness the Dynamic Gardening Way, A Health and Wellness Lifestyle,” by Jeffery Restuccio
- Aerobic Gardening Website:  
[www.ritecode.com/aerobicgardening](http://www.ritecode.com/aerobicgardening)