# Welcome


Consulting Rosarian Class

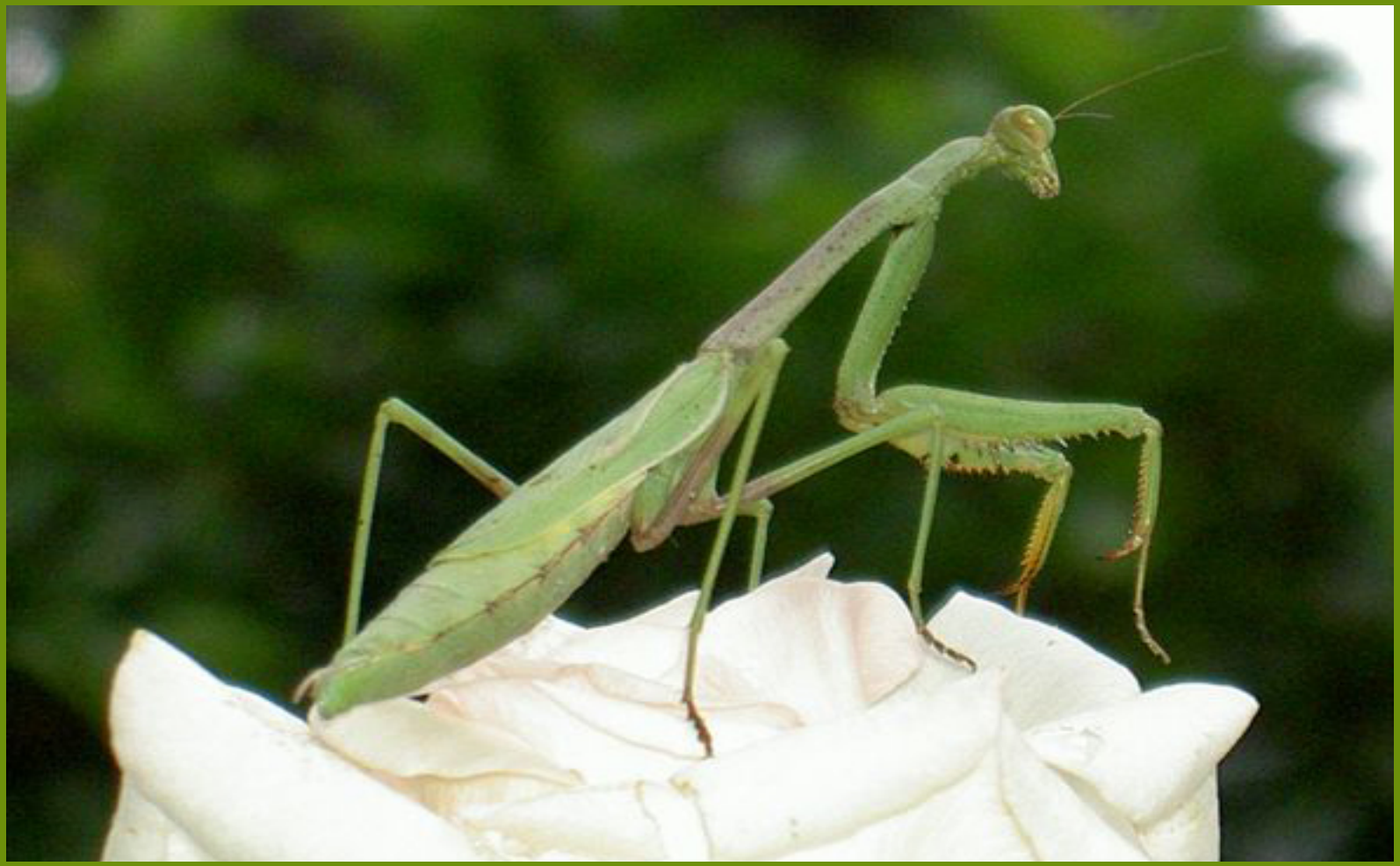
# Pest Control Basics & Garden Chemicals

# CHAPTER VII— PEST CONTROL BASICS

ARS Consulting Rosarian Manual

# Integrated Pest Management

- **A Decision Process**
  - **By observation to determine when treatment is needed & use least disruptive to the environment**
  - **Decision includes**:
    - Biological Control
    - Physical Control
    - Habitat Observation
    - Least toxic chemical required for control
- **This process is often used as a thought process, not necessarily a written exercise.**



# The 4 Elements of IPM

**The 4 Elements**

- Decision whether to treat (Prevention or Elimination)
- Decision when to treat
- Decision how to treat
- Evaluation & review of the decisions

These decisions might be made with careful study or, for the experienced grower, simply a quick mental check list.

# Treatment Consequences

- The "3 R's and an S"
  - Pesticide **R**esidue
    - Where does it go? (neighbors, your house)
    - Who else might run across the applied chemicals
    - Active life of the chemical
    - Does it get to ground water?
  - Pest **R**esistance to Pesticides
    - Black Spot Example requires varying the chemicals by MOA (Method Of Action)

# Treatment Consequences

- Pest **R**esurgence
  - How soon will they come back?
  - Pesticides kill bad guys and good guys (? Balance)
  - Pests rebuild faster than the beneficials
  - May see pest buildup within a few weeks
  - Observation modifies your spray program
- **S**econdary Pest Outbreaks
  - When one pest is killed and some beneficials also are killed, other forms of pests may now be able to attack.
  - E.g. Thrips* vs. Spider Mites

  * Using Broad Spectrum Pesticides

# Other Secondary Factors

- Health
  - Decisions relative to people (especially children)
  - Building in a factor for MTR (Recovery time)
    - How long must people stay away after spraying
    - Toxicity vs. Exposure
- Social Factors
  - Local Policies on pesticides (Neighbors, town)
  - Will Spray programs scare others away
- Cost Factors & Appearance

# Cutter Bees

# When to Treat Pests

- All pests are a part of a complex system
- Learn relationships of weather & pest activity, e.g. Thrips show up early in the year
- Build records of observations and sprayings
- Build and modify your plan of attack

# How to Treat

- Control Choices
  - Cultural Controls
    - Cultivation (Controls weeds & plants)
    - Plant Selection (Avoid roses with known problems)
      - OGR vs. Hybrid Teas, 'Peace'
    - Crop residue destruction (overwintering control-destroy residue )
  - Physical & Mechanical
    - Barriers or Traps (typical in greenhouses)
      - e.g. Japanese Beetles
    - Manual (Hand picking of pests or water wands)

# To Kill or Not to Kill?

# How to Treat— cont'd

- Biotic Control
  - Predators (Beneficials)  e.g. lady bugs
  - Parasitoids (Beneficials who lay eggs in pests)
  - Pathogens virus, fungi, bacterial microbes, protozoa
    - e.g. milky spore bacteria to control Japanese beetles
- Biological Control
  - Importation --The use of non native predators
  - Conservation --Avoiding pesticides
  - Augmentation -- Releases more beneficials

# Modes of Action

- BT (Bacillus thuringiensis) Stomach poisons
- Pheromones  Disrupt Mating
- Pheromone attractants – Trapping Insects
- Insect Growth regulators – Interrupt metamorphosis
- Botanical Pesticides  plant derived (Neem)
- Insecticidal soaps  Break pests outer covering
- Selective Pesticides  focused on limited pests
- Broad spectrum  Kills everything (good & bad)

# CHAPTER VIII— GARDEN CHEMICALS

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# Garden Chemicals

- Three Don’ts
  - Never make a recommendation for a garden chemical beyond those uses listed on the label
  - Never recommend the use of restricted chemicals
  - Never share chemicals
    - All containers must have the original label affixed

The US Environmental Protection Agency
Sets standards for both pesticide handling and use

# Definition

A **pesticide** is ANY chemical that is used by man to control pests

Therefore pesticides can be:

- Insecticides
- Fungicides
- Herbicides e.g. for weeds
- Miticides

# Insecticides

- MOA (Mode of Action)
  - Stomach (Lethal ingestion)
  - Contact (Kills on Contact)
  - Residual (Long Term Toxic)
  - Fumigant (Inhale lethal doses)
  - Repellent (Distasteful)
  - Systemic (kills on plant ingestion)


Different Insecticides attack in different ways

Rotation avoids resistance problems

# Miticides

- Used to control mites & ticks

# Fungicides

- Mode of Action (MOA)

**Protectants**

-Applied before infection of fungus

**Eradicant**

-Kills on contact after infection occurs

**Systemic**

-Translocated by leaves & roots to prevent infection

# Pesticide Toxicity

- "How Poisonous"
- Lethal Dose LD 50
  - The lethal dose to kill 50% of the study population
  - The LOWER the dose required to reach LD 50, the more toxic
- LD 50 expressed in milligrams (mg) of material per kilogram
- Book Example:

LD 50 of **Orthene** = 945 mg/Kg

A 150 lb. man = 68 Kg.

68 Kg x 945 mg/Kg = 64,260 mg or 64.26 g

This is equal to about ¼ cup

# Toxicity of Pesticides

## Probable Lethal Dose (LD50 in mg/Kg)

| Category | Signal Word | Oral | Dermal | Oral Dose for 150 lb Man |
|---|---|---|---|---|
| I Highly Toxic | Danger<br>Scull X<br>Poison | 0-50 | 0-200 | A few drops |
| II Moderately Toxic | Warning | Over 50<br>To 500 | Over 200<br>To 2,000 | 1 tsp to 1 oz |
| III Slightly Toxic | Caution | Over 500 | Over 2,000 to 20,000 | Over 1 oz to 1 pint |
| IV Toxic | Caution | Over 5,000 | Over 20,000 | Over 1 pint |

# How Pesticides Enter The Body

1. Oral- May be taken in error

2. Dermal Absorbed through the skin
   **ESPECIALLY** with concentrated materials

1. Inhalation of dust, spray mist or fumes
   Be extremely careful when mixing powders
   e.g. Dithane M45

**The Dermal and Inhaled forms are the most dangerous!!**

# Spray Attire Checklist

- Cover as much of your body as is possible
- ALWAYS wear at least:
  - Goggles
  - Long sleeved shirt/full length pants*
  - Rubber Gloves
    (Gauntlet are the best– No cotton or leather)
  - Closed toe shoes (I have a set just for spraying)
  - Respirator (#1 protection for inhalation)
  - Hat (especially when spraying above your head)
  - ALWAYS wash hands & face, then shower when finished

* Establish one set of clothing for spraying –
change after spray or **use a spray suit**

# Proper Spray Attire


**NOTICE**: There is nothing that drives a new rosarian away faster than seeing this getup!! Consider minimal complexity in talks to new rosarians.
Also the neighbors wonder how lethal the LD 50 is?

# Proper Precautions

- **Plan Ahead**
  - First check weather no wind/rain/snow
  - Second check for moisture on the leaves
  - Check Sprayer & hoses to assure no leaks
- **Mixing**
  - Put on spray gear before starting to mix
    - **Gloves are a must!!!**
  - Work in a **well ventilated** area
  - Avoid splashes and mix just enough for this round
- **Clean up carefully**

# Proper Precautions

- Always keep chemicals in original container
- Make sure label is attached
- Cover dishes, plastic pools, sand boxes to protect children and pets
- Store chemicals in a closed dark location Away from child access – MARK THE DOOR
- Note: In Florida it is often a good idea to store in a dorm room type mini refrigerator

# Pesticide Use Tips

- **READ THE LABEL**
- Use the dose recommended on the label-never more
- Label will usually tell if chemical can be mixed with other chemicals e.g. Never Miticides
- Never spray in strong sun or above 80°
- Water before spraying
- Spreader stickers ok to add if not included already
- Spray both undersides and tops of leaves
- Do not use restricted pesticides, requires license

# Chrysanthemums

# Botanical & Mineral Pesticides

| | Oral LD 50 = |
|---|---|
| • Rotenone- DANGER General Purpose Insecticide | **132**-1500 |
| • Pyrethrum- DANGER General Purpose Insecticide | **75** |
| • Diatomaceous Earth- Microscopic Daggers | 22,500 |
| • Sabadilla-dust or spray for hard shell insects | 500-5,000 |
| • Ryania-stomach poison Very Toxic to Dogs (IPM) 1.2g | |
| • Bio Neem -Neem tree seed inhibits desire to feed 5,000-Skin 50+ | |
| • Sulfur-Old fungus remedy (dust or liquid) use w/lime | |
| • Copper-Controls leaf spots,rust, downey mildew, anthracnose & scale | 7% CuSO4 **300** |

****The point here is that seemingly harmless materials can carry low LD 50**

# Non Toxic Alternatives

- Safer Soap/**Insecticidal Soap**
- Sunspray Oil
- Beneficial Insects
- Anti-Transpirants

There is no LD 50 issue here!

Pulling it all Together – An Example in Fungicide
MOA G (Blocks cellular growth in membranes)
FRAC Group: DMI fungicides (DeMethylation Inhibitors)

| Chemical Group | Product | EPA Flag | Agent |
|---|---|---|---|
| Piperazines | Funginex | 1 DANGER | triflorine |
| | Ortho Rose Pride Rose & Shrub Control | 1 DANGER | triflorine |
| Triazoles | Eagle 20 EW | 3 Caution | myclobutinil |
| | Immunox | 3 Caution | myclobutinil |
| | Banner Maxx | 3 Caution | propiconazole (2/3 tsp/14 days) |
| | Fertilome Liquid Systemic Fungicide | 2 WARNING | propiconazole (2TBSP/7Days) |

# Fungicide Types

- Two different classes or types-
  - **Broad Spectrum, Multi Site surface protectants (no leaf entry)**
    - MOA enables them to act against a broad list of fungal diseases
    - And allows them to act at multiple sites
    - Sometimes called “contact fungicides”
    - No use against EXISTING blackspot, protects against virus spread
    - Examples – Daconil, Mancozeb, Dithane M45

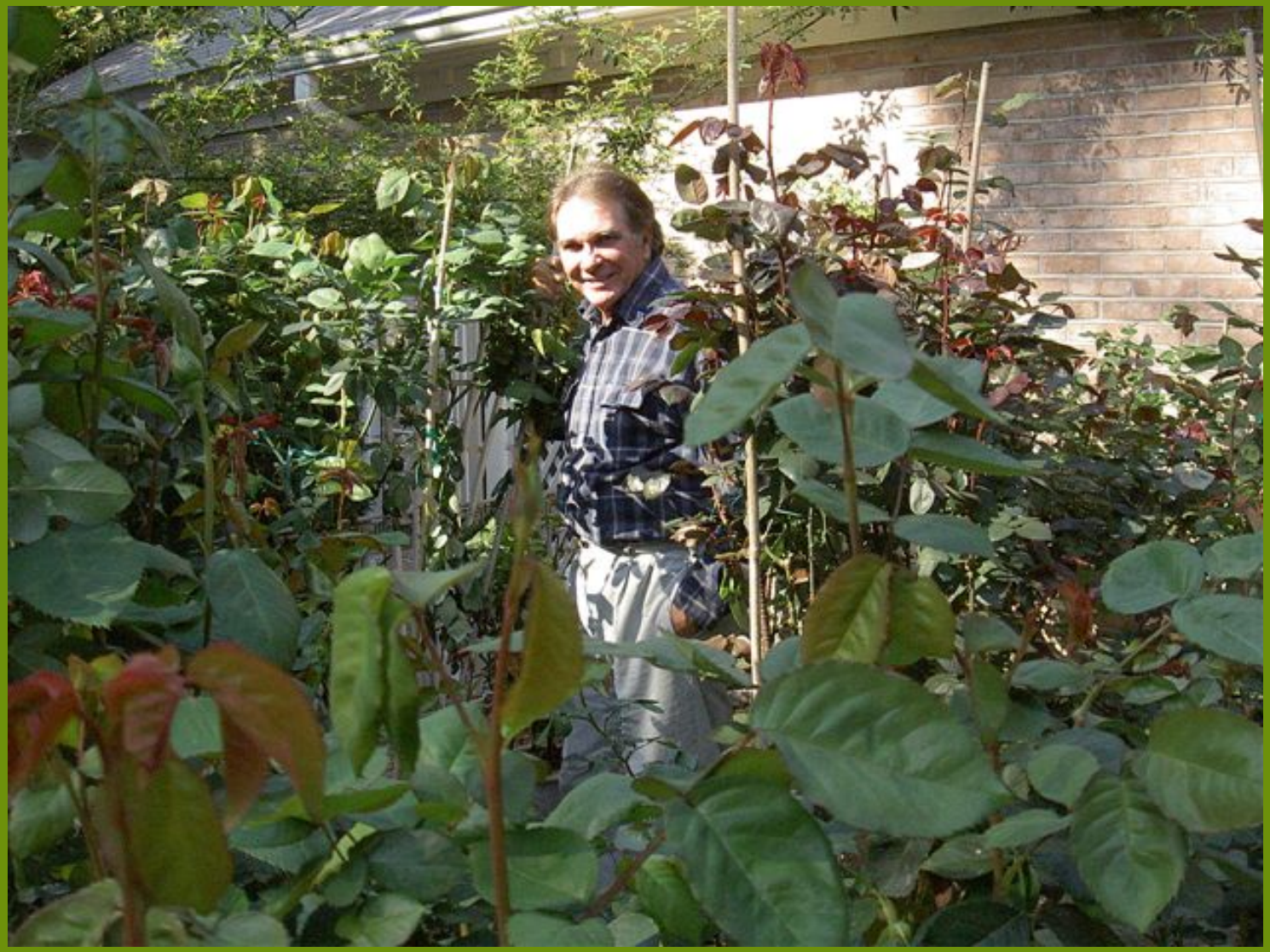
# Fungicide Types

– **Single site, mostly locally systemic – enter the leaf**

- Penetration requires a wet leaf
- Examples-
  - Sterol Inhibitors--Funginex, Bayleton, Rubigan,
  - Propiconazole – Banner Maxx, Honor Guard
  - Myclobutanil- Systhane, Immunox

- The issue here is resistance buildup, thus switch MOA frequently

# THANKS FOR LISTENING



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