

Chemical control in IPM

Important Considerations for Chemical Treatment

- **Choosing the right pesticide**
- **Purchasing insecticides**
- **Storing and using insecticides**
- **Compatibility with additives (adjuvants)**
- **Proper Equipments selection and application**
- **Measuring and diluting pesticide concentrates**
- **Safety and regulations**
- **Phytotoxicity**
- **Resistance management**

Choosing the right pesticide

- Specific to the pest to be controlled in order to spare beneficial arthropods. Eg : Dipel® and Thuricide®
- Systemic insecticides: less affected to predators and parasitoids.
- Broad spectrum insecticides → useful when more than one pest is present,
 - but they may cause a rapid resurgence of the primary or secondary pest.
Eg: Pyrethroid insecticides harmful to parasitic wasps
- Interpreting acute LD50 values → Toxicity .
 - Example: Acute oral LD50 male rat = 39 mg/kg
Acute dermal LD50 male rat = 98 mg/kg



Purchasing insecticides



- Enough product to address current pest problems to avoid hazardous storage conditions.
- Recently stocked, fresh products
- Know the generic names of insecticides in brand name products.
- Determine the application equipment needed for apply the products, as well as the required equipment and adjuvants and the product's compatibility with other pesticides.

Storing and using insecticides

Shelf life:

- An unopened container stored at moderate temperature will remain effective for 2 years.
- To prevent damage to equipment, mix a small amount of any suspect material in a jar first to see if it mixes properly.

Alkaline water

- The pH of water should be neutral (pH=7) because it affects the life of the active ingredient in solution.
- Temperature effects: OP insecticides work better at higher temperature (DDVP at about 50 to 72 °F)
- Synthetic pyrethrum derivatives work at lower temperature

Compatibility with additives (adjuvants)

Common adjuvants:

- **Spreaders:** allow pesticide to form a uniform coating layer over the treated surface
- **Stickers:** allow pesticide to stay on the treated surface
- **Foaming agents:** reduce drift
- **Thickeners:** reduce drift by increasing droplet size
- **Buffers:** allow pesticides of different acidity or alkalinity

Selection of Equipments

- **Equipment varies according to application site, choice of pesticide, and willingness to work with more complicated application devices.**
- **Pest to be controlled**
- **Stage of crop**
- **Formulation of pesticides**

Appliances of pesticides

- **DUSTERS**
- **SPRAYERS**



Proper Equipments selection

Dusters:

- Applying dry dust formulations.
- Coverage of a larger extent of crop per day than with spraying.
- Less risk of corrosion.



Bellow Duster



Rotary Duster



Plunger Duster



Knapsack Duster



Power operated Duster

Sprayers:

- Apply fluids in the form of droplets for uniform application over the plants.
- Depending on the quantity of the spray fluid required per unit area the sprayers are:
 - a. Knapsack sprayers: Agricultural pests and Mosquito control
 - b. Hand sprayers: kitchen garden, glasshouse and indoors
 - c. Rocker sprayers: tree and tall field crops
 - d. Bucket sprayer
 - e. Foot sprayers: small fruit trees
 - f. Power operated pneumatic sprayers:
 - a. extensive area in the plane



Three types of Spraying

	Spray fluid (litre per acre)	Droplet Size (μ)	Area covered (acre) per day	Equipment used
a. High volume spraying	200 – 400	150	2.5	Knapsack, Rocker sprayers
b. Low volume spraying	40 -60	70 -150	5 – 6	Power sprayers, mist blower
c. Ultralow volume spraying	2 -4	20 -70	20	ULV sprayer, Electrodyne sprayer

Other appliances

Soil injector



Tree stem injector

Granule applicator



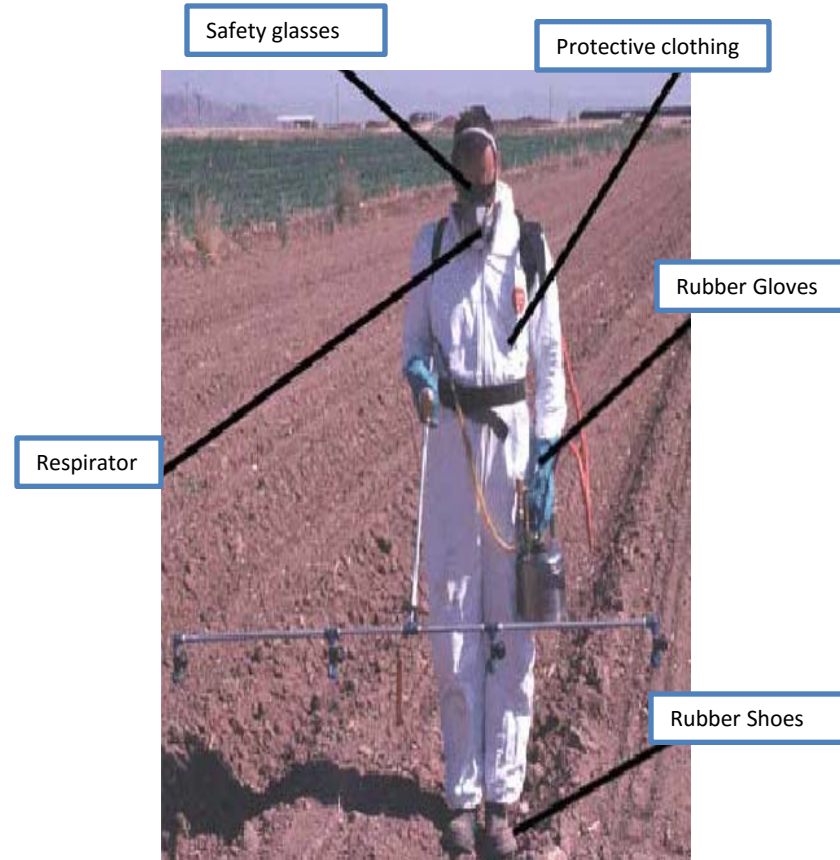
Seed dressing machine



Slurry seed treatment machine

Safety and regulations

- Know the toxicity and the necessary precautions while spraying.
- Where product labels specify wearing personal protection equipment (PPE), keep all safety equipment such as face masks, respirators, protective clothing clean, rubber gloves etc.
- Mix pesticides in a well ventilated area or outdoors.
- Avoid contact with skin, and do not breathe vapours.
- Take shower after spraying.



Phytotoxicity of pesticides to plants

- Plant damage due to application of pesticides
- Types of damage:
 - a. **Burn** : damage appear on tip, margin, as spots on leaf or entire leaf surface
 - b. **Necrosis** : death of the plant tissue
 - c. **Chlorosis**: appear as spots, tip yellowing or as general chlorosis of entire leaf
 - d. **Leaf distortion**: appear as curling, crinkling or cupping of leaf
 - e. **Stunting**: abnormal growth