



Chemical Disease Control

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Introduction

- Use of chemical compounds for the control of plant diseases is the most common method of disease management.
- These chemicals are toxic to the pathogens in two ways.
- Either they inhibit the germination, growth and Reproduction of the pathogen or they are directly lethal to the pathogen and kill the pathogen.
- The chemicals used for Disease Control have been classified based on basis of their target organisms – Fungicides, bactericides, nematocides, viricides or for the parasitic higher plants herbicides etc

Copper Compounds

- **Bordeaux mixture** It was Discovered by Millardet in 1885. It is the most widely used copper fungicide throughout the world. It is prepared by mixing copper sulphate (4kg) calcium hydroxide (4 kg) in 100 gallons of water. It is the standard fungicide against downy mildew of grapes.
- **Burgundy mixture** It is prepared by using Copper sulphate (4.5 Kg), sodium carbonate (5.7 Kg) and 50 gallons of water.
- **Chestnut compound** It was developed by Bewley in 1922. It contains copper sulphate (2 parts) and ammonium carbonate (11 parts). It is used to control damping off of seedlings.
- **Chaubatia paste** it was developed by U.B.Singh in 1942-43. It is prepared by mixing copper sulphate and red lead in 1 litre of lanolin or raw linseed oil.

Sulphur compounds

1. **Inorganic S compounds:** Elemental sulphur is used as dust, wettable powder, paste or liquid. It is used to control powdery mildew, certain rusts, leaf blights, fruit rot etc.
2. **Organic S compounds:** (Thiocarbamates) Eg. Thiram $C_6H_{12}N_2S_4$, Maneb $C_4H_6N_2MnS_4$, Zineb $C_4H_6N_2ZnS_4$, Ferbam $C_9H_{18}FeN_3S_6$, Zeram $C_6H_{12}N_2S_4, Zn$, Nabam $C_4H_6N_2Na_2S_4$, Vapam etc.

Mercury compounds

- Inorganic Hg compounds:

Mercuric chloride (HgCl_2) and mercurous chloride (Hg_2Cl_2) used at 1:1000 dilutions for soaking seeds, rhizomes and corms.

- Organic Hg compounds (Organomercurials)

Ethyl mercury chloride (trade name-ceresan)- used as foliar sprays on rice for blast control, seed treatment in cotton, groundnut pea etc.

Ethyl mercury phosphate- used as seed treatment of cotton, linseed etc.

Quinones

- Quinones are naturally present in plants. They are also produced by oxidation of phytophenolic compounds.

Chloranil-used against smut of sorghum, barley, damping off etc.

Dichlone-foliar spray in apple scab, peach leaf curl etc.

Benzene compounds

- **Diazoben-** used for seed and soil treatment for the control of damping off and root rot.
- **Chlorothalonil-**used against leaf spots, late and early blight, downey mildews, rusts, anthracnose and scab etc. as spray.
- **Dichloran-** used against fruit, vegetable and flower diseases.
- **Dinocap-** used to control powdery mildew.
- **PCNB (Pentachloronitrobenzene)-** It is a long lasting soil-fungicide. Used against soil borne diseases eg. Club root of cabbage.

Heterocyclic Nitrogen compounds

- **Captan-** used as seed protectant against *Pythium* and in reducing post-harvest losses in storage.
- **Captafol-** used to control early and late blight of potato.
- **Folpet-** used against powdery mildew.

Organo-Tin compounds

- **Brestan-** used against *Cercospora*, *Alternaria* etc.
- **Brestanol-** used against *Cercospora*, *Alternaria*, *Pythium*, *Phytophthora* etc.

Systemic fungicide

- A systemic fungicide is one which is taken in and translocated within the plant.
- **Oxathin**- first systemic fungicide discovered by Von Schmeling and Kulka (1966).
- They developed two systemic fungicides viz., **Vitavax** and **Plantvax** for complete control of internally seed-borne infection of loose smut (*Ustilago nuda*) in barley.
- **Diathane R-24**- for control of leaf rust of wheat (*Puccinia recondata*).

Antibiotics

- Antibiotic are substances which are produced by one microorganism and toxic to another microorganism. Most antibiotic are produced by actinomycetes bacteria and some fungi.
- **Streptomycin** (produced by *Streptomyces griseus*) It is effective against both gram +ve and gram-ve bacterial pathogens of plant.
- **Cycloheximide** (produced by *Streptomyces griseus*) used to control rust of wheat, bunt of wheat, powdery mildews of beans and rose.
- **Griseofulvin** (produced by *Penicillium griseofulvum*) used against powdery mildews and certain rusts.

Application patterns

- Spraying and dusting
- Seed treatment
- Soil treatment
- Wound treatment
- Postharvest disease treatment

Equipments used

- Sprayer
- Duster
- Sprayer-cum-duster
- Soil-injector guns
- Granule applicator
- Seed-dressing machines



References

- Plant Pathology by R.P.Singh
- Plant Pathology by AGRIOS
- Plant Pathology by R.S.Singh