

Protection - Chemical

Types of Activity:
Protectant vs. Systemic
- translaminar activity
Fungicidal vs. Fungistatic

Protection - Chemical

Types of chemicals: Inorganics

Bordeaux - CuSO_4 :Lime:Water
Fixed Copper - oxides of Cu
Sulfur
Lime-Sulfur

Protection - Chemical

Types of chemicals: Organic

Acylalanines	Pthalimides
Anilides	Strobilurins
Benzimidazoles	Triazoles
Carbamates	

Protection - Chemical

Current trends:

Organic

Systemic

Short-lived

Narrow spectrum of activity

→ Resistance

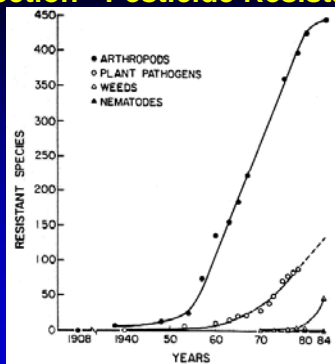
Protection - Chemical

Resistance to Pesticides

Tolerance, Insensitivity

→ Site-specific chemicals

Protection - Pesticide Resistance



Disease Control

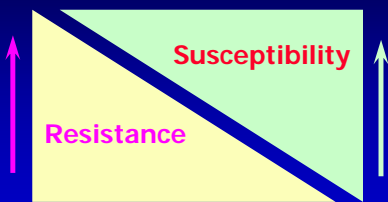
The principles:

1. Exclusion
2. Eradication
3. Protection
- ✓ 4. Resistance

Resistance

Terminology:

Resistance / Susceptibility



Resistance

Terminology:

Resistance / Susceptibility
Immunity
Tolerance
Escape
Klendusity

Clendusity

- the failure of a susceptible host to become infected, in the presence of the pathogen, because of qualities preventing or hindering the operation of a vector or other inoculating agent, e.g. a variety that is resistant to an aphid will not become infected with viruses for which the aphid is a vector.

Clendusity may be considered a form of disease escape but the term should not be applied to other forms of disease escape.

- Ability of an otherwise susceptible variety of plant to escape infection because of the way it grows (e.g., early-maturing plants escape late-season diseases)

Resistance

Types of resistance:

Specific

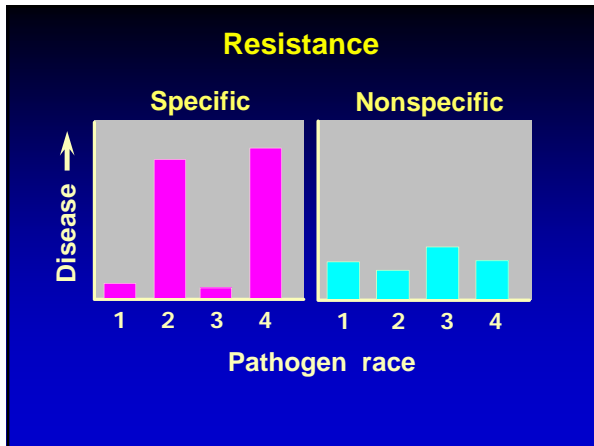
- qualitative, major-gene, vertical
- effective against some races
- resistance is complete
- controlled by one or few genes
- easy to incorporate
- easily overcome / short-lived

Resistance

Types of resistance:

Nonspecific

- quantitative, minor-gene, horizontal
- effective against all races
- resistance is incomplete
- controlled by many genes
- difficult to incorporate
- not easily overcome / durable



Resistance

Mechanisms of Resistance:

Specific
 limits infection
 hypersensitive reaction involved
 → **strong selection pressure:** resistance may break down

Nonspecific
 restricts colonization
 → **minimal selection pressure:** resistance more durable

Specific Resistance

Detecting pathogen races:

Differential cultivars
 lines with known resistance reactions to specific pathogen races

Resistance

Evolution of host-parasite relationships

Why do new races appear?
Where do R genes originate?

Resistance - Origin of R Genes

1886 de Candolle

Origin of Cultivated Plants

1916 Vavilov

Studies on the Origin of Cultivated Plants

The Origin, Variation, Immunity, and Breeding of Cultivated Plants

Centers of origin of cultivated crops

Centers of Origin



Resistance - Origin of Races

Evolution of host-parasite relationships

driving force = reproduction
disease & disease resistance
= selection pressures
→ stepwise evolution

Resistance - Origin of Races

Gene-for-gene relationship:

for every resistance gene in the host there is a corresponding gene for virulence in the pathogen

Gene-for-Gene Resistance

		Pathogen	
		V	vv
Host	R	resistant	susceptible
	rr	susceptible	susceptible
