Components of plant disease management

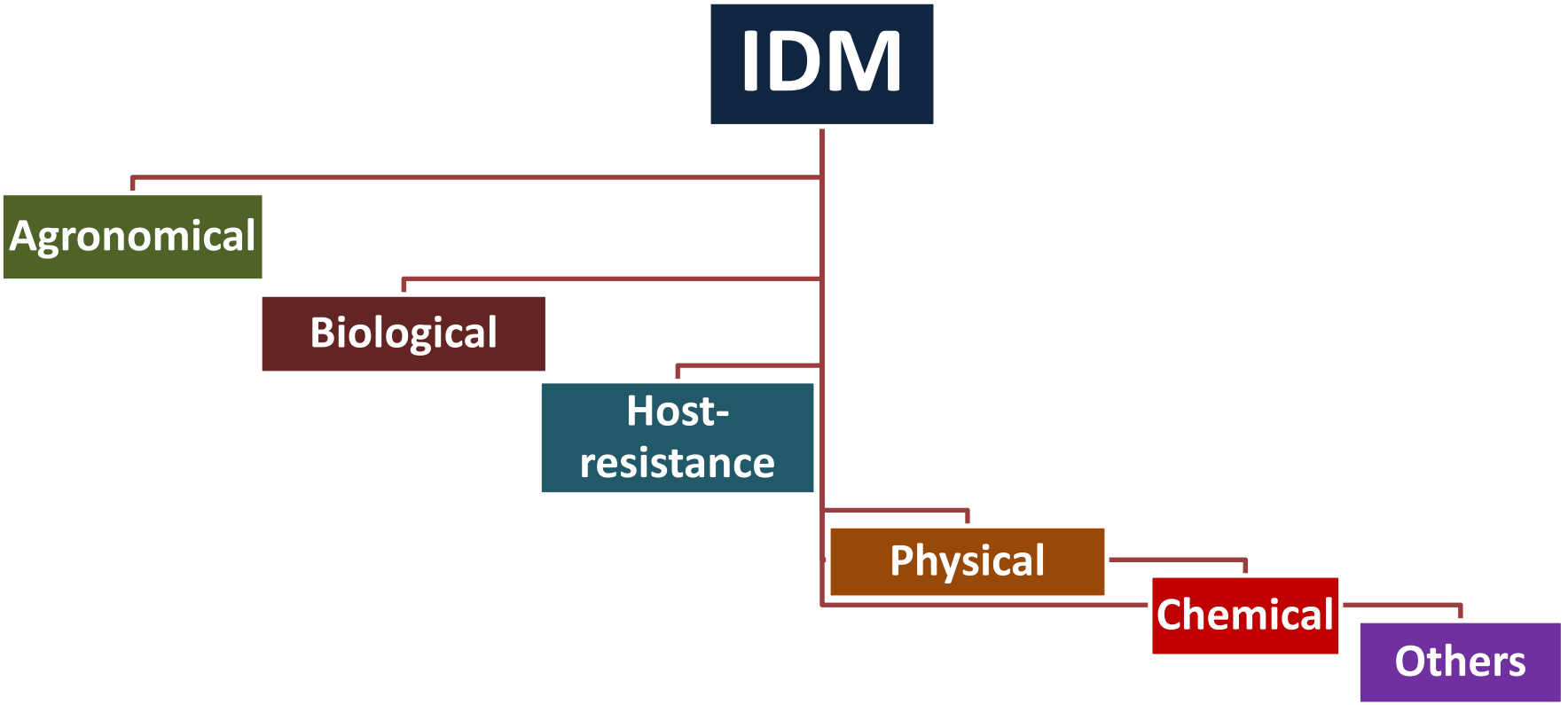
Traditional Principles of Plant Disease Control

- ***Avoidance***—prevent disease by selecting a time of the year or a site where there is no inoculum or where the environment is not favorable for infection.
- ***Exclusion—***prevent the introduction of inoculum**.**
- ***Eradication—***eliminate, destroy, or inactivate the inoculum**.**
- ***Protection—***prevent infection by means of a toxicant or some other barrier to infection.
- ***Resistance—***utilize cultivars that are resistant to or tolerant of infection.
- ***Therapy—***cure plants that are already infected.

- These principles are stated in absolute terms (e.g., "exclude", "prevent", and "eliminate") that imply a goal of zero disease.
- Plant disease "control" in this sense is not practical, and in most cases is not even possible. Indeed, we need not eliminate a disease; we merely need to reduce its progress and keep disease development below an acceptable level. Instead of plant disease **control**, we need to think in terms of plant disease **management.**

Integrated Disease Management (IDM)

- IDM is the selection of a variety of control methods based on economic, ecological and sociological consequences. IDM practices remove or alter conditions that attract or conducive to pathogens infestations, and therefore, IDM can better cure existing infestations, and prevent future ones.


IDM
Agronomical
Biological
Host-resistance
Physical
Chemical
Others

Why to adopt IDM practices?

- IDM utilizes the Best Management Practices to reduce plant disease with least disruption to the environment
- It combines best scientific research output with practical application
- It protects against hazards to humans, animals, plants and the environment while optimizing disease management within the constraints of economic, social and environmental conditions.

Principles of IDM

- Allows tolerable disease development
- Utilizes natural control measures
- Considers the environment and the natural ecosystem

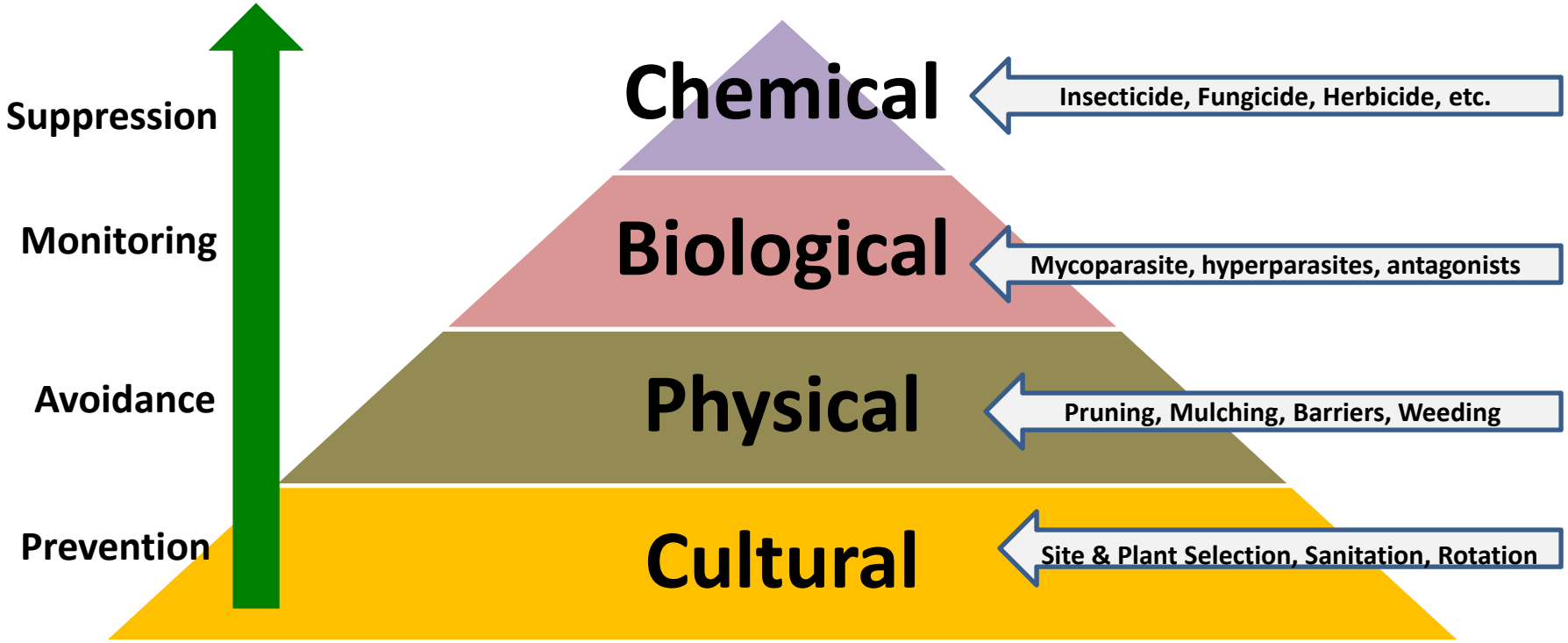
Implications of IDM

- Simultaneous management of multiple pathogens
- Regular monitoring of pathogen effects, and their natural enemies and antagonists as well
- Use of economic or treatment thresholds when applying chemicals
- Integrated use of multiple, suppressive tactics.

Traditional vs. IDM practices

- IDM practices requires:
  - Greater knowledge
  - Utilizes less toxic, more targeted techniques
  - More effective
  - Costs less, effective for longer term
  - Poses less risk
  - Requires collective effort to realize it potential

Optional Control Measures



Strategies versus *Tactics*

- The dictionary definitions for the two terms are similar, but generally speaking, an overall plan for reaching a particular objective is called a **strategy**, while the specific means for implementing a given strategy are called **tactics**.
- Any endeavor that requires a series of connected tasks for its completion also requires some kind of overall plan. Each individual task, no matter how skillfully executed or how successful its outcome, will not advance progress toward the final objective unless it has a coherent relationship with all of the other necessary tasks.

Tactics for the Reduction of Initial Inoculum

- **Avoidance**—reduce the level of disease by selecting a season or a site where the amount of inoculum is low or where the environment is unfavorable for infection
- **Exclusion**—reduce the amount of initial inoculum introduced from outside sources
- **Eradication**—reduce the production of initial inoculum by destroying or inactivating the sources of initial inoculum (sanitation, removal of reservoirs of inoculum, removal of alternate hosts, etc.)
- **Protection**—reduce the level of initial infection by means of a toxicant or other barrier to infection
- **Resistance**—use cultivars that are resistant to infection, particularly the initial infection
- **Therapy**—use thermotherapy, chemotherapy and/or meristem culture to produce certified seed or vegetative planting stock

Tactics for the Reduction of the Infection Rate

- **Avoidance**—reduce the rate of production of inoculum, the rate of infection, or the rate of development of the pathogen by selecting a season or a site where the environment is not favorable
- **Exclusion**—reduce the introduction of inoculum from external sources during the course of the epidemic
- **Eradication**—reduce the rate of inoculum production during the course of the epidemic by destroying or inactivating the sources of inoculum (roguing)
- **Protection**—reduce the rate of infection by means of a toxicant or some other barrier to infection
- **Resistance**—plant cultivars that can reduce the rate of inoculum production, the rate of infection, or the rate of pathogen development
- **Therapy**—cure the plants that are already infected or reduce their production of inoculum

Tactics for the Reduction of the Duration of the Epidemic

- **Avoidance**—plant early maturing cultivars or plant at a time that favors rapid maturation of the crop
- **Exclusion**—delay the introduction of inoculum from external sources by means of plant quarantine