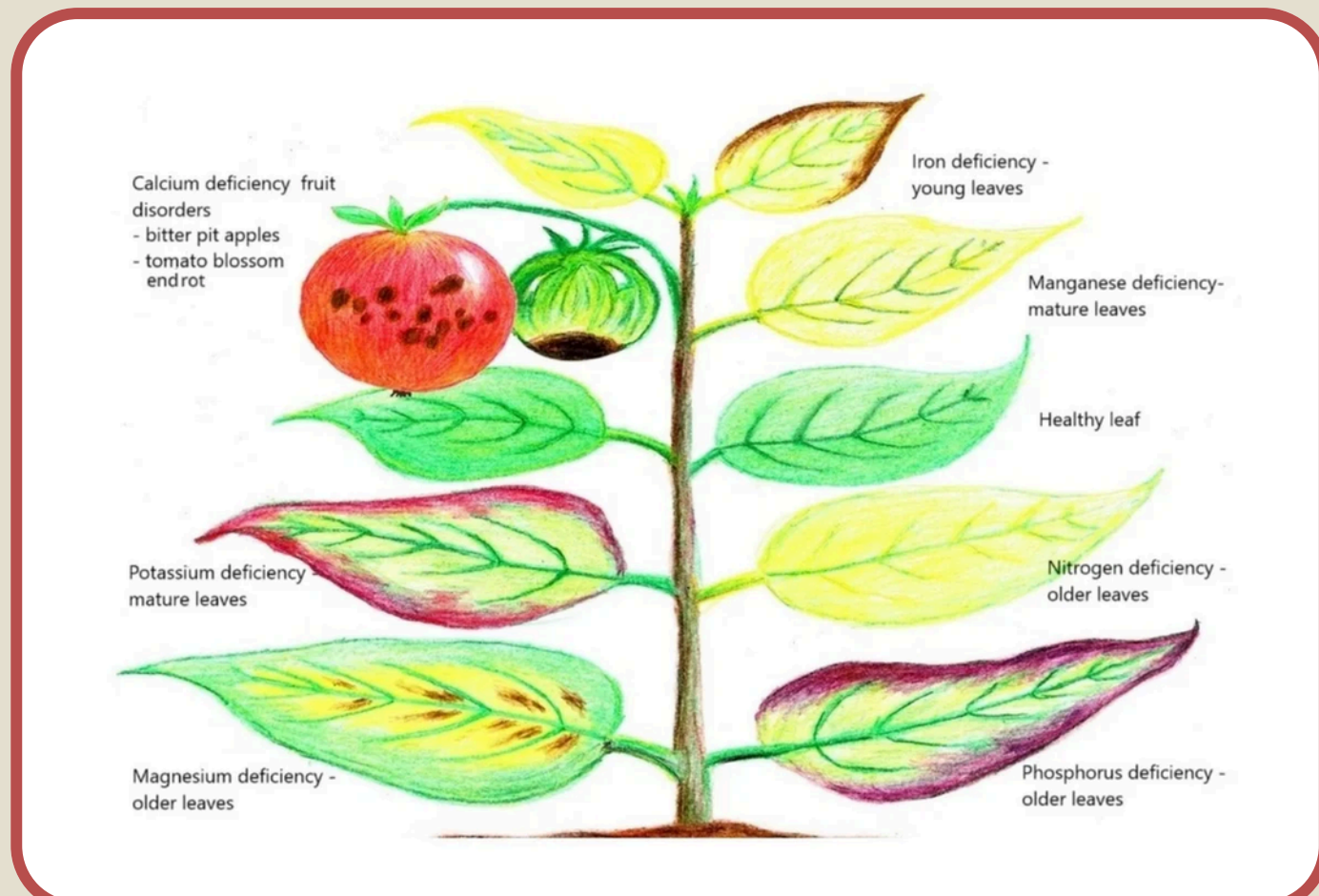




Hydroponic Vine Crop Training Series: Root Health, Nutrient Disorders & Pest Management

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DEVELOPED BY: THE KODIAK ARCHIPELAGO LEADERSHIP INSTITUTE
SUPPORTED BY: THE CHUGACH REGIONAL RESOURCE COMMISSION
AND THE ADMINISTRATION FOR NATIVE AMERICANS

Presentation Overview



^There are great plant specific resource guides online^



Root Health:

Explore strategies to maintain healthy roots, promote strong development, and prevent common root diseases.



Nutrient Disorders:

Learn how to identify nutrient deficiencies and imbalances, and how to correct them before they impact plant health.



IPM (Integrated Pest Management):

Understand pest severity levels and explore effective, preventative approaches to managing pests.

Key Components to Healthy Root Development



- **Water Source** - Treated water is ideal. If using well water or experiencing issues, consider testing your water quality.
- **Water Temperature** - Maintain temperatures between 65–75°F. Warmer water can promote pathogens and root rot, while colder water can slow root development and transpiration.
- **Aeration (Oxygenated Water)** - Proper aeration ensures roots receive sufficient oxygen, supporting healthy growth and function.
- **Balanced PH, EC & Nutrients** - In addition to water and oxygen, maintaining balanced nutrient levels, pH and proper environmental conditions is essential for root health.

Healthy Roots = Happy Plants!

Identifying Vine Crop Nutrient Disorders

Nitrogen(N) - Yellowing of older leaves



Phosphorus(P) - Purple discoloration in older leaves



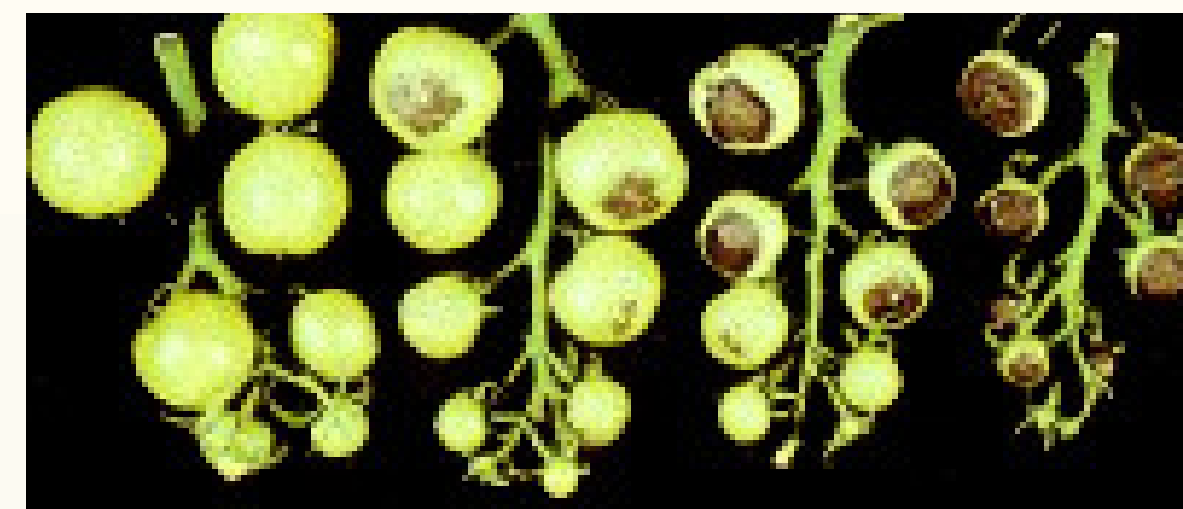
Potassium(K) - Yellowing or browning along leaf edges of older leaves



Key Takeaway: Mobile nutrients (N, P, K) show deficiencies first in older leaves because the plant moves these nutrients to support new growth.

Identifying Vine Crop Nutrient Disorders

Calcium(Ca) - Appears as blossom end rot; new leaves may show yellowing, browning, and curling



Magnesium(Mg) - Yellowing along leaf edges with green veins; may develop light brown spots between veins



Sulfur(S) - Pale yellowing between veins; begins in new growth and may spread downward



Key Takeaway: Immobile nutrients (Ca, S) show deficiencies in new growth, while mobile nutrients (Mg) appear first in older leaves.

Identifying Vine Crop Nutrient Disorders

Iron(Fe) - Yellowing between veins (interveinal chlorosis) in new growth; may spread to leaf tips and down the plant



Manganese(Mn) - Interveinal yellowing in new growth; veins and stems remain green



Zinc(Zn) - Yellowing along the main vein; browning begins at leaf edges and progresses inward



Key Takeaway: Most micronutrient deficiencies are immobile, so symptoms typically appear first in new growth.

Identifying Vine Crop Nutrient Disorders

Copper(Cu) - Pale green interveinal areas; reduced leaf size and downward leaf curling



Molybdenum(Mo) - Interveinal yellowing with possible orange spotting; veins remain green

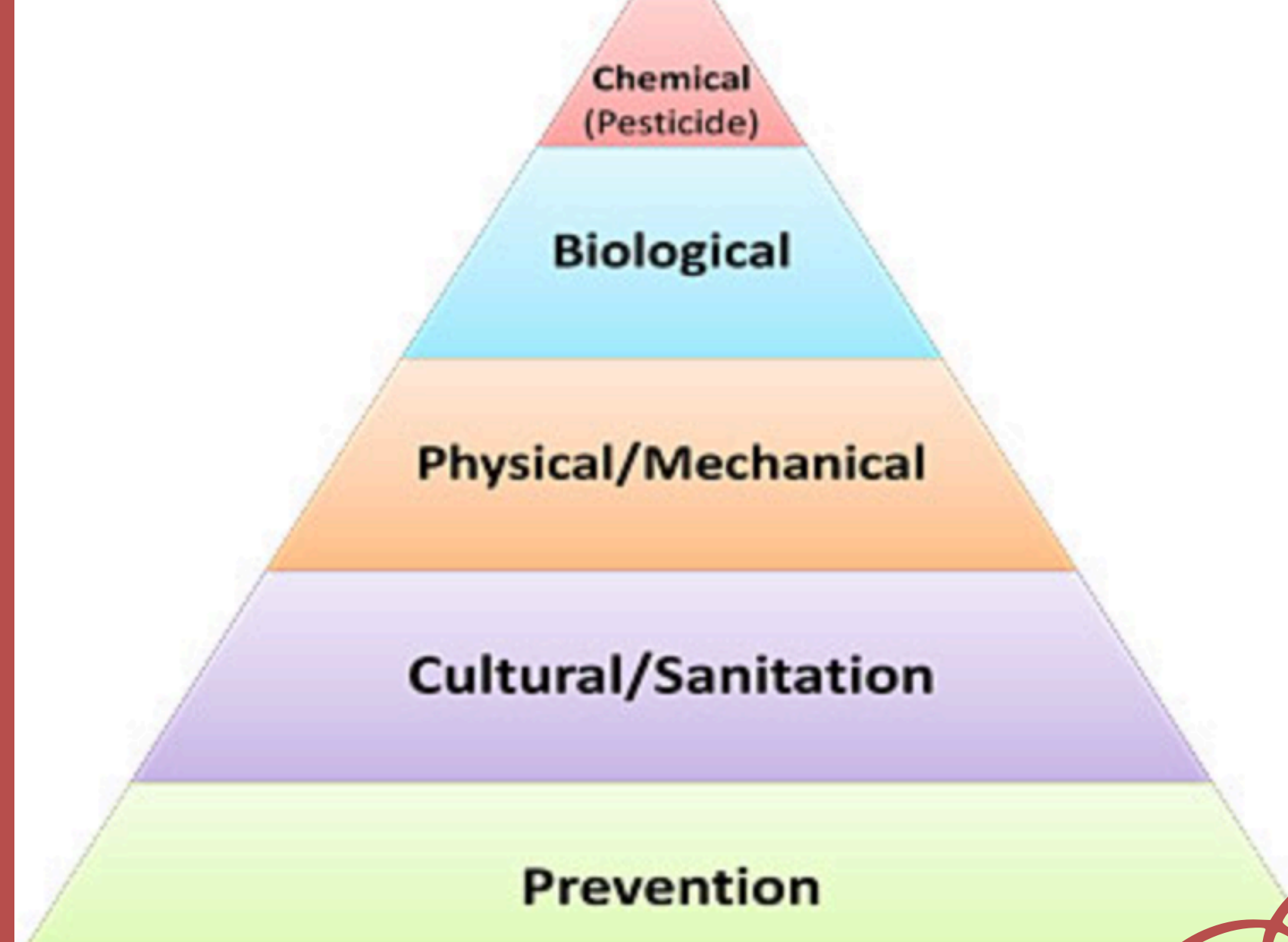


Boron(B) - Stem necrosis; yellowing or browning along leaf edges progressing inward; distorted or spiraling new growth



IPM - Integrated Pest Management

Start with prevention, monitor consistently, and act early.



- **Prevent**

- Maintain a clean growing environment (equipment, space, plants, and people)
- Remove unhealthy plant material promptly
- Promote plant health—healthy plants are more resistant to pests

- **Inspect**

- Monitor plants regularly, early signs indicate potential issues
- Use sticky traps throughout the growing space
- Use a hand lens or magnifier to identify pests accurately

- **Act**

- Introduce natural predators (beneficial insects)
- Apply natural oils or soaps (e.g., neem oil, insecticidal soap)
- Remove heavily infested plants if necessary

BENEFICIAL INSECT IPM CHART

BENEFICIAL INSECT	HARMFUL INSECT										
	Spider Mites	Flat Mites	Aphids	Thrips	White Flies	Fungus Gnats	Gnat Larvae	Mealy Bugs	Scales	Beetles	Caterpillars
LadyBug (<i>Hippodamia convergens</i>)	Effective Control		Effective Control	Effective Control	Effective Control			Partially Effective Control	Effective Control		
Pirate Bug (<i>Orius insidiosus</i>)	Effective Control		Effective Control	Effective Control	Effective Control			Partially Effective Control	Effective Control		
Praying Mantis (<i>Tenodera sinensis</i>)	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find	Will Eat Anything It Can Find
Green Lacewing (<i>Chrysopa rufilabris</i>)			Effective Control	Effective Control	Effective Control			Partially Effective Control	Effective Control		
Spider Mite Predators (<i>Phytoseiulus persimilis</i> , <i>Neoseiulus californicus</i> , <i>Mesoseiulus longipes</i>)	Effective Control										
Spider Mite Destroyers (<i>Stethorus punctillum</i>)	Effective Control										
White Fly Parasite (<i>Encarsia formosa</i>)					Effective Control						
Aphid Predators (<i>Aphidoletes aphidimyza</i>)		Effective Control									
Aphid Parasites (<i>Aphidoletes matricariae</i>)		Effective Control									
Predatory Nematodes				Effective Control		Effective Control	Effective Control				Effective Control
Thrip Predator Mites (<i>Amblyseius cucumeris</i>)	Effective Control			Effective Control							
Fungus Gnat Predators (<i>Hypoaspis</i>)	Effective Control			Partially Effective Control		Effective Control	Effective Control				
Mealy Bug Destroyer (<i>Cryptolaemus montrouzieri</i>)			Effective Control					Effective Control	Effective Control		
★ Spinosad (<i>Saccharopolyspora spinosa</i>)	Partially Effective Control		Effective Control								Effective Control
★ <i>Bacillus thuringiensis</i>						Effective Control	Effective Control				

Common Beneficial Insects

- Introduce at early stages of pest infestation before it is too late!
- Choose the right insects for your issues! Some species can help control various pest populations
- Order online as needed



Common Vine Crop Pests

Aphids



Spider Mites



Thrips



Fungus Gnats



Whiteflies



Russet Mites



Key Takeaway: Early detection is critical, regular scouting helps prevent outbreaks.



IDM - Integrated Disease Management

Maintain a Clean Environment

- Keep tools, equipment, hands, and clothing clean to prevent cross-contamination
- Clean your growing system regularly and refresh nutrient reservoirs on a set schedule (ZeroTol or Hydrogen Peroxide are recommended for cleaning)
- Don't forget to prune old growth and dead leaves!

Use Clean Water & Nutrients

- Test water quality (pH, alkalinity, and potential contaminants such as heavy metals; test for pathogens if using untreated sources)
- Filter or treat water as needed before use
- Use reliable nutrients: store properly, measure accurately, and replace regularly
- Consider beneficial microbes to support plant health (e.g., mycorrhizae products)
- Tip: Let water sit ~24 hours before use to allow chlorine to dissipate when using beneficial microbes!

Ensure Proper Aeration & Ventilation

- Avoid stagnant water and poor airflow, both can promote disease development

Low / Mid
Risk level

Identifying Vine Crop Diseases

Pythium - A root rot pathogen causing slimy, brown, discolored roots



Powdery Mildew - White, powdery spots that spread across leaves and can reduce photosynthesis



Downy Mildew - Causes leaves to turn gray or brown and dry out, leading to leaf death



Identifying Vine Crop Diseases

Botrytis - A blight that appears as fuzzy gray mold on leaves, stems, and fruit



Fusarium Wilt - Causes yellowing and wilting, often on one side of the plant; can lead to plant decline



Blight - Brown, leathery spots that spread rapidly, leading to plant death and reduced yield



Key Takeaway: Once disease is established, management becomes difficult, early prevention and removal are critical.

High
Risk Level



Tobacco Mosaic Virus

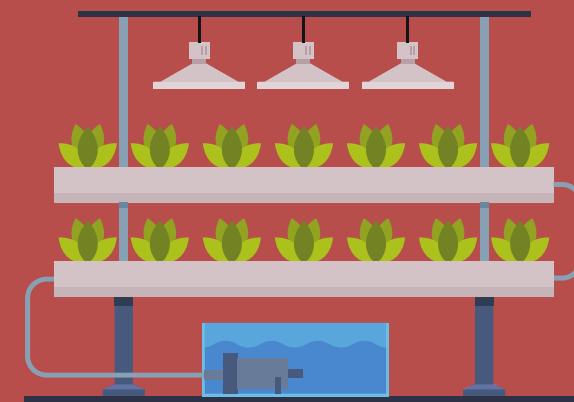
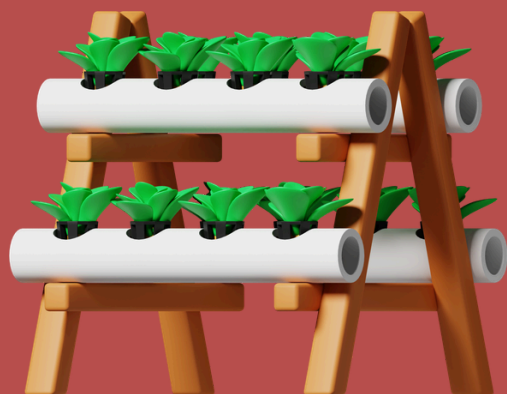
- Causes mottled yellow–green leaf patterns, distortion, and stunted growth
- Reduces fruit quality and yield; may cause uneven ripening or spotting
- Spreads easily through contaminated tools, seeds, and plant handling
- **Can be transmitted by workers who use tobacco products (wear gloves!)**
- Affects many nightshade crops (e.g., tomatoes, peppers)
- Often requires complete removal of infected plants to prevent spread

There is no cure, prevention and sanitation are critical!

Presentation Summary.

- Healthy plants start with strong roots, balanced nutrients (don't forget about pH!), and a clean growing environment
- Don't forget to clean your system between planting cycles! (when in doubt, change your nutrients out!)
- Identify issues early by observing where symptoms appear (new vs. old growth)
- Regular scouting is key, early detection prevents major pest and disease outbreaks
- Prioritize prevention: sanitation, plant health, and proper environmental conditions
- Act quickly and appropriately, small issues can escalate rapidly in controlled environments (as they can become a pest paradise!)

“Start with prevention, monitor consistently, and act early.”



Quyanaa - Thank you!

Sources

Dr. Triston Hooks

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Biosystems Engineering
Hydroponic Specialist - University of Arizona

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Hydroponics Technical Advisor - Kodiak, AK

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