

Integrated Pest Management in Horticulture

Integrated Pest Management (IPM) in Horticulture

Concise, organized notes for quick reference and deeper study.

1. What Is IPM?

Element	Description
Definition	A decision-making process that uses a combination of cultural, biological, mechanical, and chemical tools to manage pest populations at economically acceptable levels while minimizing risks to humans, non-target organisms, and the environment.
Goal	Preserve crop quality and yield, protect ecosystem health, and reduce reliance on broad-spectrum pesticides.
Core Principle	“Pest management is a continuum” – start with the least disruptive tactics and only add more intensive measures when thresholds are exceeded.

2. The IPM Decision-Making Cycle

1. Monitoring & Scouting

- Regular field walks, traps, and visual inspections.
- Record pest presence, life stage, and damage symptoms.

2. Identification

- Use dichotomous keys, field guides, or expert consultation.
- Distinguish between harmful pests, benign organisms, and beneficials.

3. Establish Action Thresholds

- The pest density at which economic loss exceeds the cost of control.
- Thresholds are crop-specific, stage-specific, and region-specific.

4. Preventive & Cultural Controls

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- Crop rotation, resistant varieties, sanitation, proper spacing, irrigation management, and soil health practices.

5. Control Tactics (applied only if thresholds are exceeded)

- **Biological** – natural enemies, microbial agents, pheromone disruption.
- **Mechanical/Physical** – traps, barriers, hand-picking, pruning.
- **Chemical** – selective pesticides, reduced-rate applications, seed treatments.

6. Evaluation & Record-Keeping

- Assess effectiveness, side-effects, and cost.
- Adjust future thresholds and tactics accordingly.

3. Major Pest Groups in Horticulture & Typical IPM Strategies

Pest Group	Common Species	Key Damage	Primary IPM Tactics
Insects	• Aphids (e.g., <i>Myzus persicae</i>)	Sap loss, virus transmission, leaf bronzing	– Reflective mulches & row covers
	• Whiteflies (<i>Bemisia tabaci</i>)		– Beneficial insects (lady beetles, predatory mites)
	• Spider mites (<i>Tetranychus spp.</i>)		– Insecticidal soaps / neem oil (selective)
Nematodes	• Root-knot (<i>Meloidogyne spp.</i>)	Root galls, stunted growth	– Soil solarization, cover crops (e.g., marigold)
	• Lesion (<i>Pratylenchus spp.</i>)		– Nematicidal biocontrol (e.g., <i>Bacillus firmus</i>) – Fumigants only as last resort
Fungi	• Powdery mildew (<i>Erysiphe spp.</i>) • Botrytis (<i>B. cinerea</i>) • Phytophthora (<i>P. infestans</i>)	Leaf spots, fruit rot, stem blight	– Resistant cultivars – Adequate canopy airflow, drip irrigation – Biological fungicides (e.g., <i>Trichoderma spp.</i>)

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Pest Group	Common Species	Key Damage	Primary IPM Tactics
Weeds	• Pigweed, crabgrass, volunteer lettuce	Competition for nutrients, water, light	– Mulch, cover crops, mechanical cultivation –