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COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES
EXTENSION

Topics for Today's Discussion

1. Early-season pests should tomato and cucurbit growers be keeping an eye out for this year?
2. New Changes to Pesticide Labels for 2025
3. Plant Scouting Tips
4. Key Signs Gowers Often Miss
5. Cultural Practices to Help Keep Early-Season Pests in Check?
6. Advice When it Comes to Rotating Insecticides?
7. Biological Control Options that Work Well Early in the Season?
8. Key Decisions After Transplanting to Stay Ahead of Pests?
9. Go-to Tools, Scouting Guides, or Threshold Charts that you Recommend?

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1. Early-Season Pests Tomato and Cucurbit Growers Should be Keeping an Eye Out For

- **Presented by Prof. DeBacco**

Flea Beetles

- **Description**: Small, shiny beetles (1–2 mm) that jump when disturbed.
- **Damage**: Adults chew small, round holes in leaves, creating a "shothole" appearance. Seedlings are particularly vulnerable, as heavy feeding can stunt growth or kill plants. Damage is most severe in spring when plants are small.
- **Timing**: Active early in the season (April–June), especially after transplanting.
- **Management**:
  - **Cultural**: Use row covers to protect seedlings. Delay transplanting until soil warms to reduce beetle activity. Remove weeds (ex. mustards) that serve as alternate hosts.
  - **Chemical**: Apply foliar insecticides like spinosad (organic-approved) or pyrethroids (ex. permethrin) for conventional systems. Systemic seed treatments (ex. imidacloprid) can provide early protection.
  - **Monitoring**: Scout fields for shothole damage on cotyledons and true leaves. Thresholds vary but are typically 5–10 beetles per plant.

Cutworms

- **Description**: Grayish-brown caterpillars (1–2 inches long) that curl into a C-shape when disturbed.
- **Damage**: Larvae feed at night, cutting stems at or below the soil line, causing seedlings to collapse. A single cutworm can destroy multiple plants in one night.
- **Timing**: Most active in early spring (March–May) after transplanting, especially in fields with high organic matter or weed residue.
- **Management**:
  - **Cultural**: Plow fields 2–3 weeks before planting to expose larvae to predators. Use cardboard or plastic collars around stems to prevent access.
  - **Chemical**: Apply baits (ex. carbaryl) or foliar sprays (ex. Bacillus thuringiensis for organic systems) at dusk. Target larvae before significant damage occurs.
  - **Monitoring**: Check for cut plants or wilting seedlings in the morning. Scout low-lying areas where cutworms are more prevalent.

Aphids

- **Description**: Small, soft-bodied insects (1–3 mm) that cluster on undersides of leaves or stems. Green peach aphids are pale green, while potato aphids are pink or green.
- **Damage**: Suck sap from leaves, causing curling, stunting, and yellowing. Transmit viruses like Tomato Yellow Leaf Curl Virus (TYLCV) and Potato Virus Y (PVY). Early infestations weaken plants, reducing yield potential.
- **Timing**: Active early in the season (April–June), especially in warm, dry conditions. Greenhouse tomatoes are also at risk.
- **Management**:
  - **Cultural**: Use reflective mulches to deter aphids. Encourage natural enemies like lady beetles, lacewings, and parasitic wasps.
  - **Chemical**: Apply insecticidal soap or neem oil (organic) or systemic insecticides like imidacloprid or flonicamid (conventional). Avoid broad-spectrum sprays that harm beneficials.
  - **Monitoring**: Scout for colonies on new growth or sticky honeydew on leaves. Action thresholds are typically 5–10 aphids per leaf.

Damping-Off (Pythium, Rhizoctonia, Fusarium)

- **Pathogen**: Soil-borne fungi (Pythium, Rhizoctonia, Fusarium)
- **Symptoms**: Seedlings fail to emerge (pre-emergence damping-off) or collapse at the soil line with water-soaked, shriveled stems (post-emergence). Roots may be brown or rotted.
- **Conditions**: Favored by cool, wet soils (50–68°F for Pythium, 68–77°F for Rhizoctonia) and poor drainage. Common in early spring (March–May) or greenhouse settings.
- **Impact**: Causes significant stand loss, requiring replanting. Weakened seedlings are more susceptible to other stresses.
- **Management**:
  - **Cultural**: Use sterile, well-drained potting mix for transplants. Avoid overwatering and ensure proper soil temperature (above 70°F for planting). Raise beds to improve drainage.
  - **Chemical**: Treat seeds with fungicides like mefenoxam (FRAC 4) for Pythium or fludioxonil (FRAC 12) for Rhizoctonia. Soil drenches with biofungicides (ex. Bacillus subtilis, FRAC BM02) are organic options.
  - **Monitoring**: Inspect seedlings for wilting or stem lesions. Test soil for pathogen presence if damping-off is recurrent.

2. New Changes to Pesticide Labels for 2025

- **Presented by Prof. DeBacco**

Fungicide Spray Guide and Chemical Alternatives for Tomato

- Guide for Tomatoes…
- 2025 NCU Fungicide Spray Guide for Tomato in North Carolina https://drive.google.com/file/d/1V2WpQ_XDWoWJSbyUYwaaeMkDppRXtIjN/view
- 2025 NC State Efficacy of Chemical Alternatives for Tomato
- https://drive.google.com/file/d/10sBLvnikPQ-NTaYrSvqBgD3mLfgrNfvo/view
- Images provided on next two slides…

NC STATE EXTENSION

2025 Fungicide Spray Guide for Tomato in North Carolina

NC STATE EXTENSION

Inga Meadows, Department of Entomology & Plant Pathology

The following suggested weekly spray programs (Table 1) are designed to manage the primary foliar and/or fruit diseases (early blight, late blight, bacterial spot, Septoria leaf spot, and gray mold [Fig. 1]) on fresh-market tomato in NC and account for the label restrictions of different products. There are many products on the market that are also effective at controlling some of these diseases (Table 2). Be sure to check current labels as product restrictions can change.

In weeks 1-8, select a program based on the products available. In week 9 to the end of harvest, if late blight is a consistent threat (typically in western NC), then consider one of the late blight programs. If late blight is NOT a threat, continue the early blight program; however, if Aprovia Top or Luna Tranquility were used in Weeks 1-8, then season limits will have been reached and discontinue use of these products.

Table 1. Suggested weekly spray programs for fresh-market tomato production.

Week	Program 1	Program 2	Program 3	Program 4*
Before harvest:				
1	mancozeb (M) + [copper (M)] + Actigard (21)*			
2	mancozeb (M) + [copper (M)] + Actigard (21)			
3	mancozeb (M) + [copper (M)] + Actigard (21) + (pick one program & stick with it to meet label restrictions)			
	Inspire Super (3+9)	Priaxor (7+11)	Aprovia Top (7+3) OR Luna Tranquility (7+9) OR Miravis Prime (7+12)**	strobilurin* (11)
4	mancozeb (M) + [copper (M)] + Actigard (21)			
5	mancozeb (M) + [copper (M)] + Actigard (21) + (insert Program product)			
	Fontelis (7) OR Endura (7)	mancozeb (M) + Switch (9+12)	Aprovia Top (7+3) OR Luna Tranquility (7+9)	Fontelis (7) OR Endura (7)
6	mancozeb (M) + [copper (M)] + Actigard (21)			
7**	mancozeb (M) + [copper (M)] + Actigard (21) + (insert Program product)			
	Inspire Super (3+9)	Priaxor (7+11)	Aprovia Top (7+3) OR Luna Tranquility (7+9) OR Miravis Prime (7+12)**	strobilurin* (11)
8**	mancozeb (M) + [copper (M)] + Actigard (21)			
During harvest: If late blight is a threat, use late blight products; else, use early blight products				
9	chlorothalonil (M) + (insert Program product)			
	Fontelis (7) OR Endura (7)	Switch (9+12)	Aprovia Top (7+3) OR Luna Tranquility (7+9)	Fontelis (7) OR Endura (7)
10	Presidio (43) OR Ranman (21) OR Orondis Ultra (49+40) OR Zampro (45+40) OR Revus Top (40+3)			
11***	Fontelis (7) OR Endura (7) OR Switch (9+12) + chlorothalonil (M)			
12***	Presidio (43) OR Ranman (21) OR Orondis Ultra (49+40) OR Zampro (45+40) OR Revus Top (40+3)			
13***	Fontelis (7) OR Endura (7) OR Switch (9+12) +chlorothalonil (M)			
14***	finish with chlorothalonil (M)			

Color denotes disease controlled: Red=Early blight & Septoria leaf spot; Blue=bacterial spot, speck; Green=Fungal diseases & bacterial spot; Purple=late blight; Orange=early blight & late blight

[copper (M)]=optional—copper is ineffective at controlling bacterial spot, but is necessary for fungal control if not using single-site fungicides.

***Actigard** applications should be applied at LOWEST rate to reduce the risk of **plant stunting and yield loss. Regalia, Lifegard, and Serenade** have some efficacy against bacterial spot.

****Miravis Prime** has some efficacy against bacterial spot.

*Resistance to **strobilurins** is known to occur in the early blight pathogen in NC; if resistance is suspected, use alternate program.

****For late season plantings:** If late blight is in the area, consider chlorothalonil for late blight control beginning Week 7 or 8.

*****Continue early blight program or use Revus Top if early blight pressure is high for weeks 11-14.**

Table 2. Selected products labeled for use on tomato in NC. **Always check the most current label before use.**

Common name (active ingredient)	FRAC*	PHI (days)	Product name
fixed copper	M01	Varies; check label	(various)
acibenzolar-S-methyl	21	14	Actigard 50WG
Bacillus subtilis strain QST 713 (OMRI)	44	0	Serenade Opti, Serenade ASO
Bacillus mycoides isolate J (OMRI)	P6	0	Lifegard WG
Reynoutria sachalinensis (OMRI)	P5	0	Regalia
mancozeb	M03	5	(various)
difenoconazole + cyprodinil	3+9	0	Inspire Super (GM)
difenoconazole + benzovindiflupyr	3+7	0	Aprovia Top
boscalid	7	0	Endura (GM)
mefentrifluconazole	3	0	Cevya
flutriafol	3	0	Rhyme
tetraconazole	3	0	Mettle
penthiopyrad	7	0	Fontelis
fluopyram + pyrimethanil	7+9	1	Luna Tranquility (GM)
pydiflumetofen + fludioxonil	7+12	0	Miravis Prime
pyrimethanil	9	1	Scala
cyprodinil + fludioxonil	9+12	0	Switch
strobilurin (azoxystrobin)	11	0	Quadris
strobilurin (pyraclostrobin)	11	0	Cabrio EG
strobilurin (fenamidone)	11	14	Reason
strobilurin (azoxystrobin) + difenoconazole	11+3	0	Quadris Top
strobilurin (azoxystrobin) + flutriafol	11+3	0	Topguard
strobilurin (pyraclostrobin) + fluxapyroxad	11+7	7	Priaxor (GM)
strobilurin (trifloxystrobin) + fluopyram	11+7	3	Luna Sensation (GM)
azoxystrobin + chlorothalonil	11+M05	3	Quadris Opti
famoxadone + cymoxanil	11+27	3	Tanos
mandipropamid + difenoconazole	40+3	1	Revus Top
chlorothalonil	M05	0	(various)
chlorothalonil + cymoxanil	M05+27	3	Ariston
chlorothalonil + potassium phosphate	M05+33	0	Catamaran
mefenoxam (S)	4	7	Ridomil Gold
cyazofamid	21	0	Ranman
zoxamide + chlorothalonil	22+M03	5	Zing!
propamocarb (S)	28	5	Previcur Flex
fluopicolide (S)	43	2	Presidio
ametoctradin + dimethomorph	45+40	4	Zampro
oxathiapiprolin (S) + mandipropamid	49+40	1	Orondis Ultra
oxathiapiprolin (S) + chlorothalonil	49+M05	0	Orondis Opti

*FRAC=Fungicide Resistance Action Committee code; Products with the same FRAC number do not count as a rotation partner

(OMRI) OMRI Approved product; (GM) This product also controls gray mold.

(S) This product has systemic activity; it can be used after plants are infected with late blight to slow disease progression.

Have ideas to improve the guide? We would love to read them!

The research behind this document was funded in part by the North Carolina Tomato Growers.

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Note: *Recommendations for the use of agricultural chemicals are included here as a convenience to the reader. The use of brand names and mention or listing of commercial products does not imply endorsement by North Carolina State University nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Examine a current product label before applying any chemical. For assistance, contact your county North Carolina Cooperative Extension Service agent.*

Efficacy of chemical alternatives for disease control on tomato, 2024

Inga Meadows and Ella Reeves, Department of Entomology and Plant Pathology

NC STATE UNIVERSITY

Product	Active ingredients	Bacterial canker (*Clavibacter michiganensis*)	Bacterial speck (*Pseudomonas syringae* pv. *Xanthomonas perforans*)	Bacterial spot	Buckeye rot (*Phytophthora* spp.)	Damping-off pathogens (*Pythium* spp., *Fusarium*	Early blight / Alternaria (*Alternaria linariae*)	Fusarium wilt (*Fusarium oxysporum* f. sp.	Gray mold/Botrytis (*Botrytis cinerea*)	Gray leaf spot (*Stemphylium* spp.)	Late blight (*Phytophthora infestans*)	Leaf mold (*Fulvia fulva*)	Powdery mildew (*Leveillula taurica*, and	Septoria leaf spot (*Septoria lycopersici*)	Target spot (*Corynespora cassiicola*)	Root-knot nematode (*Meloidogyne* spp.)	Southern blight (*Athelia rolfsii*)	Verticillium wilt (*Verticillium* spp.)	White mold/timber rot (*Sclerotinia sclerotiorum*)	Notes and Remarks
Serenade Opti/ASO	*Bacillus subtilis strain* QST 713			**													NC			May provide control of early blight and Septoria leaf spot when alternated with Regalia
Double Nickel 55, Double Nickel, LC, Triatholon BA	*Bacillus amyloliquefascien* strain D747	NC	**	*			*					**								
OxiDate 5.0, ZeroTol 2.0, OxiDate 2.0	hydrogen peroxide + peroxyacetic acid			NC			*				NC	**		*						
fixed coppers (various)	various copper formulations	*	**	**			**				**	**		*						
sulfur (various)	sulfur												**							
Serifel	*Bacillus amyloliquefascien* strain MBI 600																			
LifeGard WG	*Bacillus mycoides* isolate J	*	*	*																
Amplitude, Stargus	*Bacillus amyloliquefascien* strain F727 cells and spent fermentation media																			
AVIV	*Bacillus subtilis* strain IAB/BS03																			
Leap ES	*Bacillus thuringeiensis* subsp. *kurstaki* strain ABTS-351 germentation solids, spores, and insecticidal toxins + methyl salicylate			*																
AgriPhage	bacteriophage			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
ProBLAD Verde	Banda de lupinus albys doce																			
Contans WG	*Coniothyrium minitans* strain CON/M/91-08																			
Regalia, Regalia CG	extract of *Reynoutria sachalinensis*		*	NC			*					**								May provide control of early blight and Septoria leaf spot when alternated with Serenade Opti
EcoSwing	extract of *Swinglea glutinosa*																			
SoilGard	*Gliocladium virens* strain GL-21		NC	NC	NC		NC		NC	NC	NC	NC	NC	NC	NC					
Vacciplant	laminarin																			
Carb-O-Nator, MilStop	potassium bicarbonate																			
Howler	*Pseudomonas chlororaphis* strain AFS009							NC												
Actinovate AG	*Streptomyces lydicus* WYEC 108		**	*			*					NC								
RootShield WP, RootShield Granules	*Trichoderma harzianum* Rifai strain T-22																			
RootShield WP Plus, RootShield Granules Plus	*Trichoderma harzianum* Rifai strain T-23 + *T. virens* strain G41																			
fixed copper alt. Lifegard	(see above)	*		NC																

**	**Significantly better control than no treatment in more than 50% of studies, minimum of four studies**
*	**Significantly better control than no treatment in two or more studies**
NC	**No control in two or more studies**
	No data

Note: Efficacy data is based on examining at least two published reports evaluating the products alone for efficacy in controlling the disease listed.

Note: Chlorpyrifos

- June 30, 2025, is the last date when the use of existing stocks is permitted.
- This means that growers of crops that have been on the label in previous years can apply this insecticide to those crops consistent with label directions without any violation until June 30, 2025.
- Growers with existing stocks of chlorpyrifos may use them according to the label until this date.

https://www.canr.msu.edu/news/veggie-chlorpyrifos-update-for-2025

Table 1. Growers can use existing stocks of the below chlorpyrifos products through June 30, 2025, for canceled crops.

Commercial name	Manufacturer
Pilot 4E, Pilot 15G	Gharda
Chlorpyrifos 4EC	Tide International
Chlorpyrifos 4E AG, Quali-Pro Chlorpyrifos 4E	Adama
Vulcan	Adama
Liberty Chlorpyrifos 4E	Liberty
Drexel Chlorpyrifos 15G,	Drexel
Drexel Chlorpyrifos 4E-AG	Drexel
Drexel Chlorpyrifos 15GR	Drexel
Drexel Chlorpyrifos 4E-AG2	Drexel
Warhawk, Warhawk Clearform	Loveland

Coragen® eVo (Chlorantraniliprole)

- **Type**: Insecticide
- **IRAC Group**: 28 (Diamide)
- **Use**: Targets caterpillars (ex. tomato hornworms, armyworms) and other chewing pests in tomatoes, lettuce, sweet corn, and other vegetables.
- **Details**: Launched by FMC in the U.S. in 2023, this high-concentration formulation of chlorantraniliprole offers improved efficacy and flexibility in application. It's effective against lepidopteran pests, with a favorable environmental profile and minimal impact on beneficial insects when used as directed. Global sales of chlorantraniliprole products exceeded $2 billion in 2023, with projections of $2.5 billion in coming years, indicating strong adoption.
- **Status**: Available in the U.S. for tomato growers in 2025, following its 2023 launch.
- **Source**: AgroPages, 2023

Sivanto® Prime (Flupyradifurone)

- **Type**: Insecticide
- **IRAC Group**: 4D (Butenolide)
- **Use**: Manages sucking pests such as aphids, whiteflies, and thrips in tomatoes.
- **Details**: While not newly registered in 2025, Sivanto Prime has been increasingly adopted for tomato pest management due to its precision against sucking pests and safety for pollinators. Its label includes tomatoes, and it's noted for use in integrated pest management (IPM) programs. Recent discussions in pest management guidelines (ex. UC IPM) highlight its efficacy.
- **Status**: Available in the U.S. for tomatoes in 2025, with established use in prior years.
- **Source**: General pesticide management resources, UC IPM

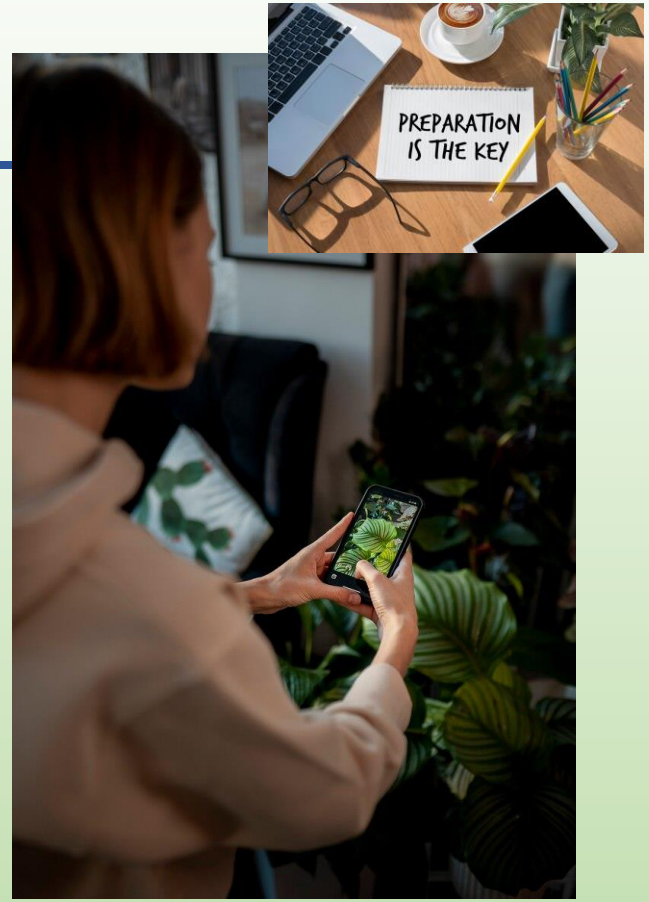
Plant Scouting Tips

- Preparation for Scouting
- Scouting Strategy
- What to Inspect on Each Plant
- Specific Signs to Watch For
- Recording and Analyzing Observations
- Follow-Up Actions
- Additional Tips for Effective Scouting
- Common Mistakes to Avoid
  - Presented by Prof. DeBacco

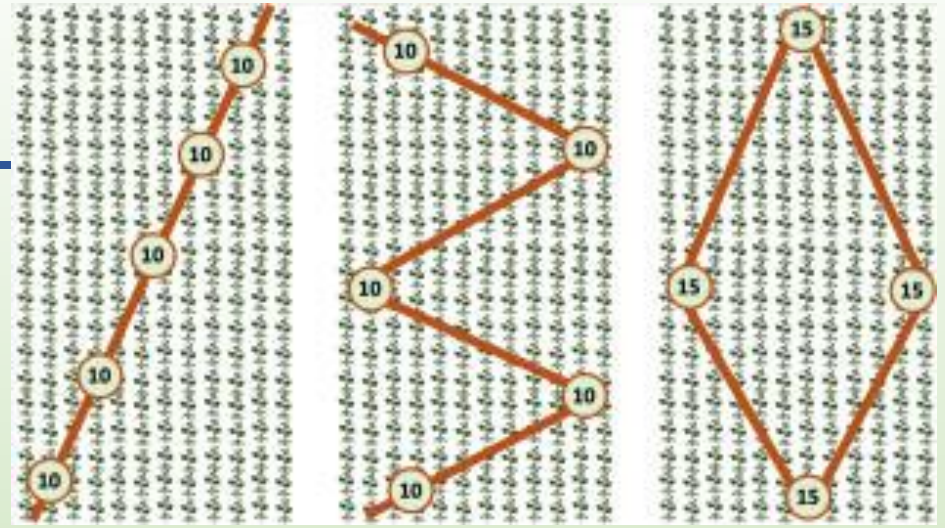
Preparation for Scouting

. **Timing**: Scout early in the morning when pests are less active, dew highlights fungal issues, and plants are less stressed. Avoid midday heat, which can mask symptoms like wilting.

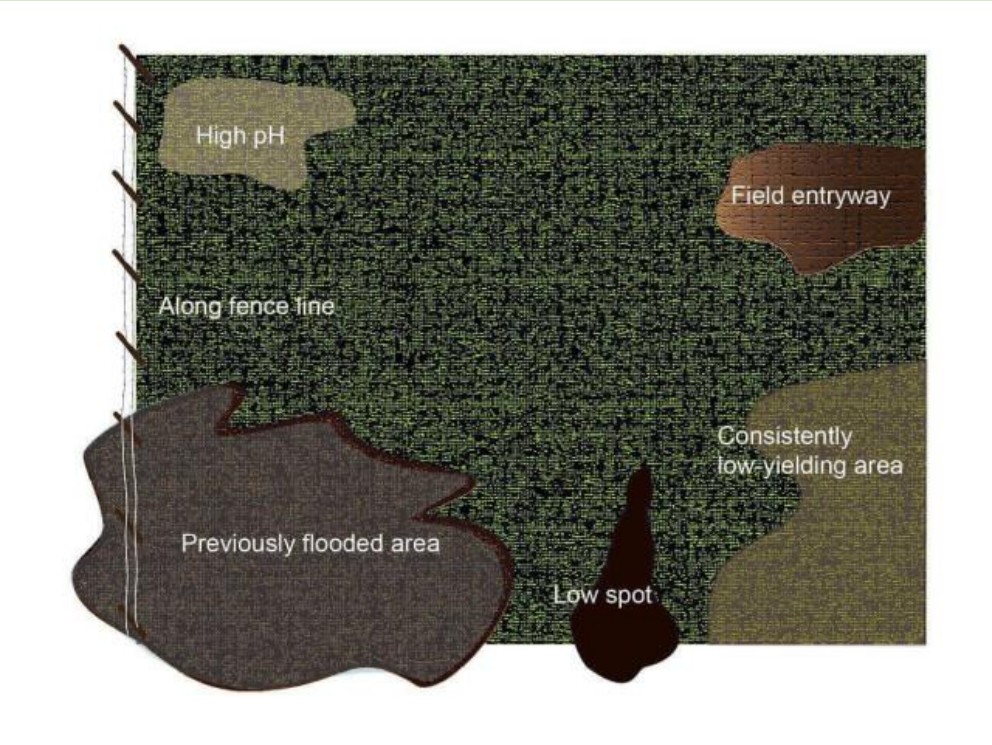
- **Frequency**: Scout at least weekly, but increase to twice weekly during critical growth stages (ex. flowering, fruit set) or during weather conducive to pests/diseases (ex. warm and humid for blight, hot and dry for spider mites).
- **Tools**:
  - **Hand lens (10x magnification)**: For identifying tiny pests like spider mites or aphids and early disease symptoms.
  - **Notebook or scouting app**: Record observations, including location, symptoms, and severity, to track trends over time.
  - **Camera/phone**: Document symptoms for later comparison or consultation with experts.
  - **Sticky traps or yellow cards**: Place near plants to monitor flying pests like whiteflies or aphids.
  - **Soil moisture meter**: Check for over- or underwatering issues.
  - **Pruning shears or knife**: Cut stems to inspect for vascular discoloration (ex. Fusarium wilt).
- **Knowledge**: Familiarize yourself with common tomato pests, diseases, and deficiency symptoms in your region. Use resources like local extension services or pest identification guides.



Scouting Strategy



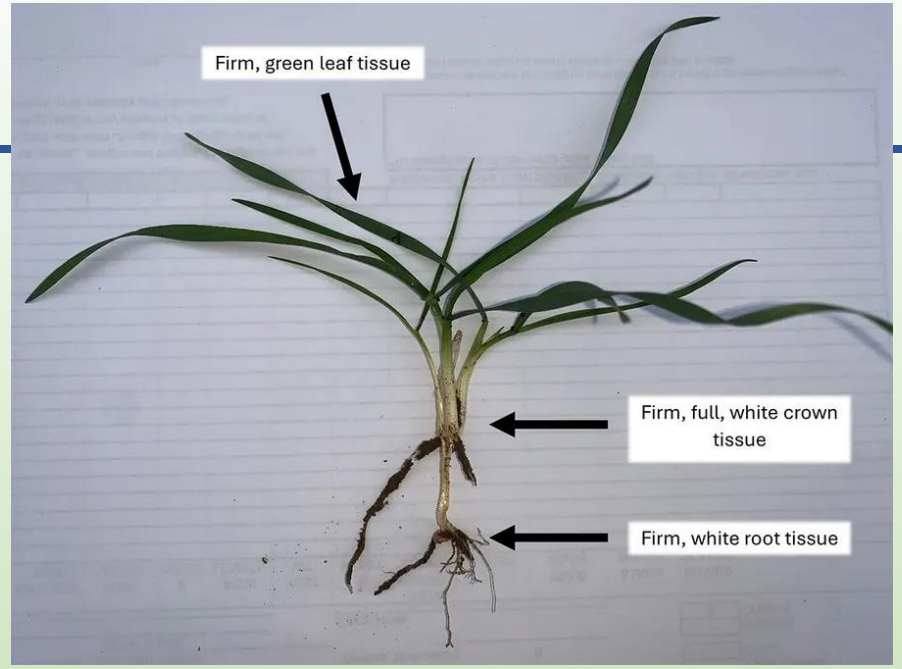
- **Randomized Sampling**: Avoid checking only the healthiest or most accessible plants. Use a zigzag or W-shaped pattern across the field to cover all areas, including edges (where pests often start) and interiors.
- **Sample Size**: Inspect at least 10–20 plants per acre, depending on field size, focusing on representative plants and any showing visible symptoms. For larger fields, divide into manageable sections.
- **Hotspot Monitoring**: Pay extra attention to areas with a history of issues, poor drainage, or dense canopy, as these are more prone to pests and diseases.
- **Borders and Adjacent Areas**: Check field edges, as pests like whiteflies or weeds often invade from nearby vegetation. Inspect adjacent crops or wild plants for potential pest/disease reservoirs.



What to Inspect on Each Plant

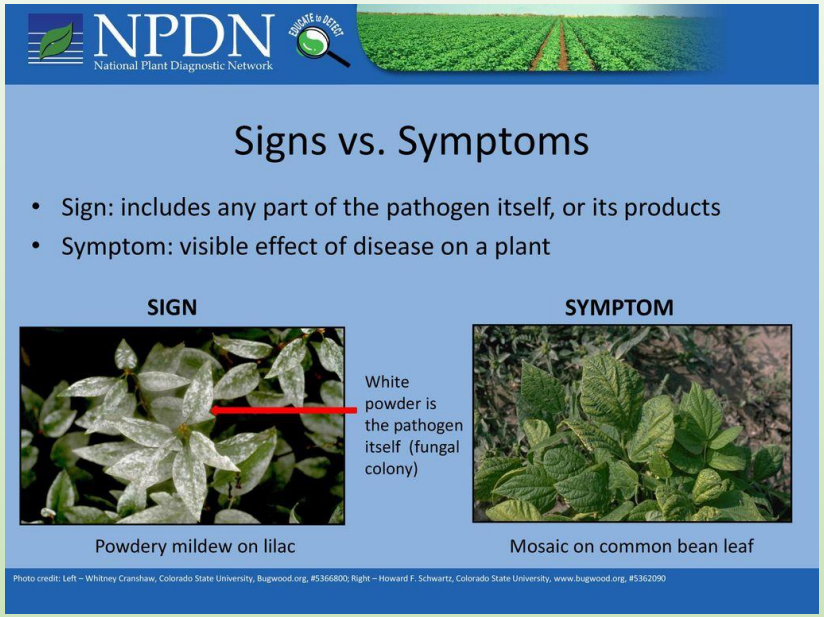
To thoroughly scout, examine all parts of the plant systematically:

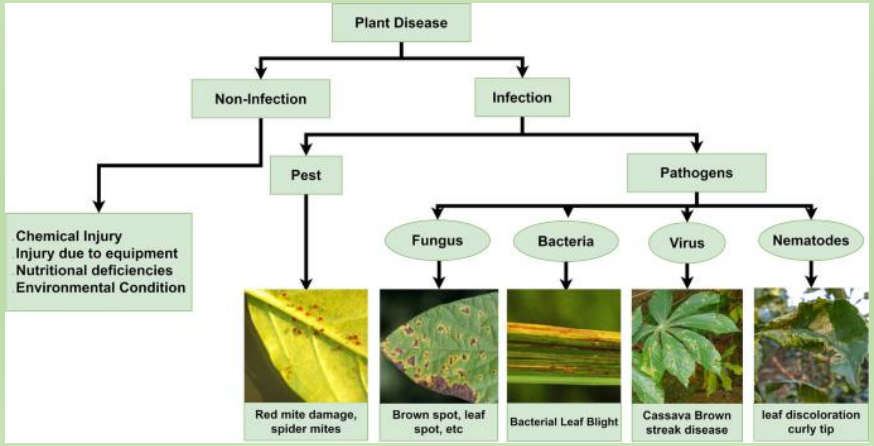
- **Leaves**:
  - **Upper Surface**: Look for spots (early blight) or powdery coatings (powdery mildew).
  - **Undersides**: Check for pests like aphids, whiteflies, or spider mite webbing, as many prefer hidden areas or fuzzy areas (leaf mold)
  - **Color and Texture**: Note yellowing, wilting, curling, or chlorosis (ex. nitrogen deficiency causes older leaves to yellow; magnesium deficiency shows interveinal yellowing).
- **Stems**:
  - Inspect for lesions, discoloration, or wilting (Ex. bacterial wilt causes sudden collapse).
  - Cut a stem near the base to check for brown or discolored vascular tissue, indicating wilts like Fusarium or Verticillium.
- **Roots and Soil Line**: Gently dig around the base to inspect roots for rot, discoloration, or nematode galls.
- Look for cutworm damage (severed stems)



Specific Signs to Watch For

- **Pests**:
  - **Direct Evidence**: Live insects, larvae, or eggs
  - **Indirect Evidence**: Frass (droppings), webbing, sticky honeydew (from aphids/whiteflies), or chewed leaves.
  - **Trapping**: Use sticky traps to quantify flying pest populations and detect early infestations.
- **Diseases**:
  - **Fungal/Bacterial Signs**: Spots, lesions, mold, or water-soaked areas (encouraged in humid conditions).
  - **Viral Symptoms**: Mosaic patterns, leaf distortion, or stunted growth
  - **Progression**: Note whether symptoms start on older leaves (Ex. nitrogen deficiency) or newer growth (Ex. calcium deficiency).
- **Nutrient Deficiencies**:
  - Look for characteristic patterns, like yellowing between veins (magnesium).
- **Environmental Stress**:
  - Check for wilting despite adequate soil moisture (heat stress or root issues).
  - Later in the season fruit cracking (overwatering) or sunscald (overexposure after pruning).



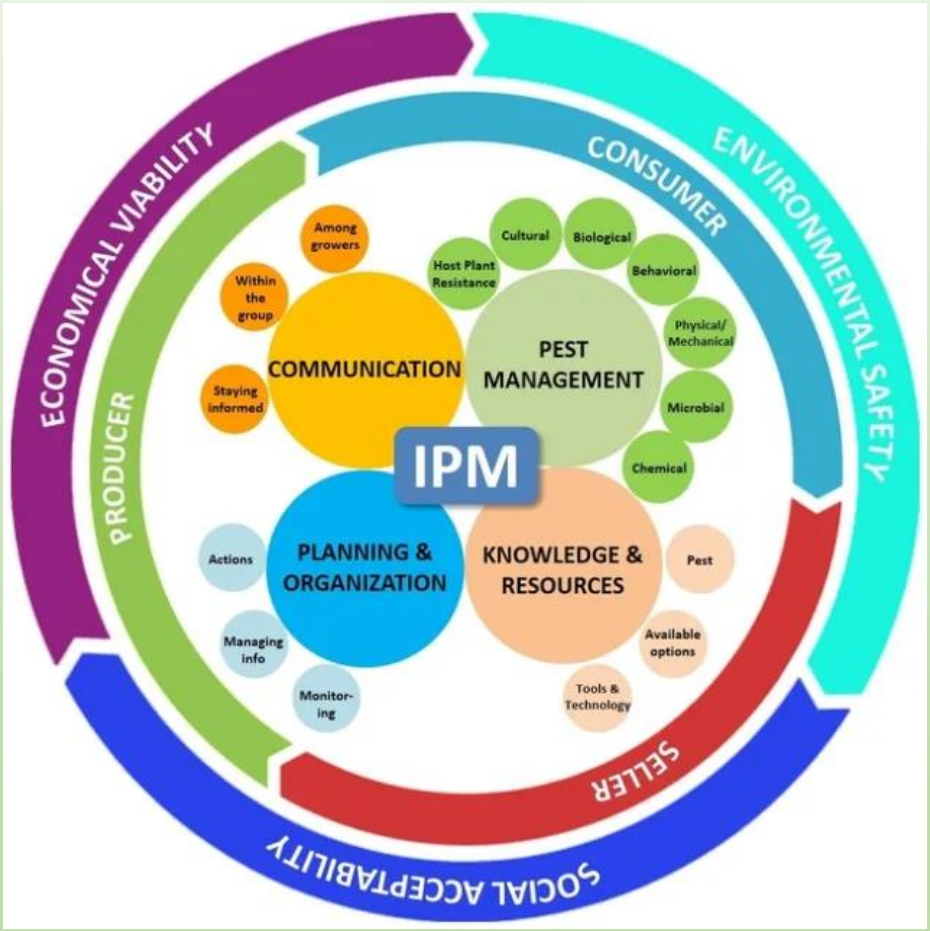


Recording and Analyzing Observations

- **Document Details**: Record the date, location, plant stage, weather conditions, and specific symptoms
  - Ex. *10% of plants in row 3 show early blight spots on lower leaves*
- **Map Issues**: Sketch or use GPS (in properties of many cameras) to mark problem areas for targeted treatment.
- **Track Trends**: Compare weekly data to identify spreading issues or treatment efficacy.
- **Consult Experts**: If symptoms are unclear, send photos or samples to a local extension service or plant pathology lab.

Follow-Up Actions

- **Immediate Response**: Remove heavily infested or diseased plants (bag and dispose to prevent spread) if practical.
- **Thresholds**: Use economic thresholds (ex. 5% aphid-infested plants) to decide on treatments like insecticides or fungicides.
- **Integrated Pest Management (IPM)**:
  - Introduce beneficial insects if pest levels are low.
  - Adjust irrigation or fertilization based on deficiency or stress symptoms.
  - Improve air circulation through pruning or spacing.
- **Long-Term Planning**: Rotate crops, select resistant varieties, or amend soil to prevent recurring issues.



Additional Tips for Effective Scouting

- **Weather Awareness**: Monitor forecasts, as rain increases fungal risks, while heat boosts spider mites. Scout more frequently after storms or temperature swings.
- **Worker Training**: Train farm staff to recognize key symptoms and report them during routine tasks like pruning or harvesting.
- **Weed Control**: Inspect for weeds, which harbor pests and compete for resources. Remove them promptly.
- **Seasonal Adjustments**: Focus on seedling issues (damping-off) early in the season, flowering/fruit set problems mid-season, and late-season diseases like late blight.
- **Technology**: Consider drones with imaging for large fields or apps for real-time pest/disease identification

Common Mistakes to Avoid

- **Bias Toward Healthy Plants**: Don’t skip struggling plants; they often reveal early issues.
- **Ignoring Subtle Signs**: Small spots or minor yellowing can escalate quickly.
- **Inconsistent Scouting**: Irregular checks miss critical windows for intervention.
- **Overlooking Soil/Environment**: Root issues or poor drainage often cause above-ground symptoms.

Summary of Tips

- Use magnifying tools to check for tiny pests or early disease signs.
- Inspect roots and soil, not just foliage.
- Scout at different times (ex. early morning for dew-related fungal signs).
- Use apps or journals to log observations and spot trends.
- Combine scouting with soil tests to confirm nutrient or pH issues.

Key Signs that Growers Often Miss

- **Presented by Prof. DeBacco**

Importance of a Soil Test

- It does take some time and organization, but the results are worth it.

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optimum	Optimum	Above Optimum	Excessive*
Calcium	**1161 lbs/acre**				
Magnesium	**185 lbs/acre**				
Phosphorus	**11 lbs/acre**				
Potassium	**115 lbs/acre**				

**** Excessive only defined for Phosphorus (>40 lbs/acre)***

Soil pH (1:1, H2O)	5.6
Est. Cation Exch. Capacity (cmole+/100g)	13.0
Buffered pH (Mod. Mehlich)	5.8

Base Saturation	***%***	***Suggested***
Potassium	1	2.0 - 7.0
Magnesium	6	10 - 30
Calcium	22	40 - 50

Element	***ppm***	***Soil Range in CT***
Boron (B)	0.1	0.1 - 2.0
Copper (Cu)	0.2	0.3 - 0.8
Iron (Fe)	7.1	1.0 - 40.0
Manganese (Mn)	2.6	3.0 - 20.0
Zinc (Zn)	3.1	0.1 - 70.0
Sulfur (S)	17.4	10 - 100
Aluminum (Al)	133.3	10 - 300
Est. Total Lead (Pb)	low	

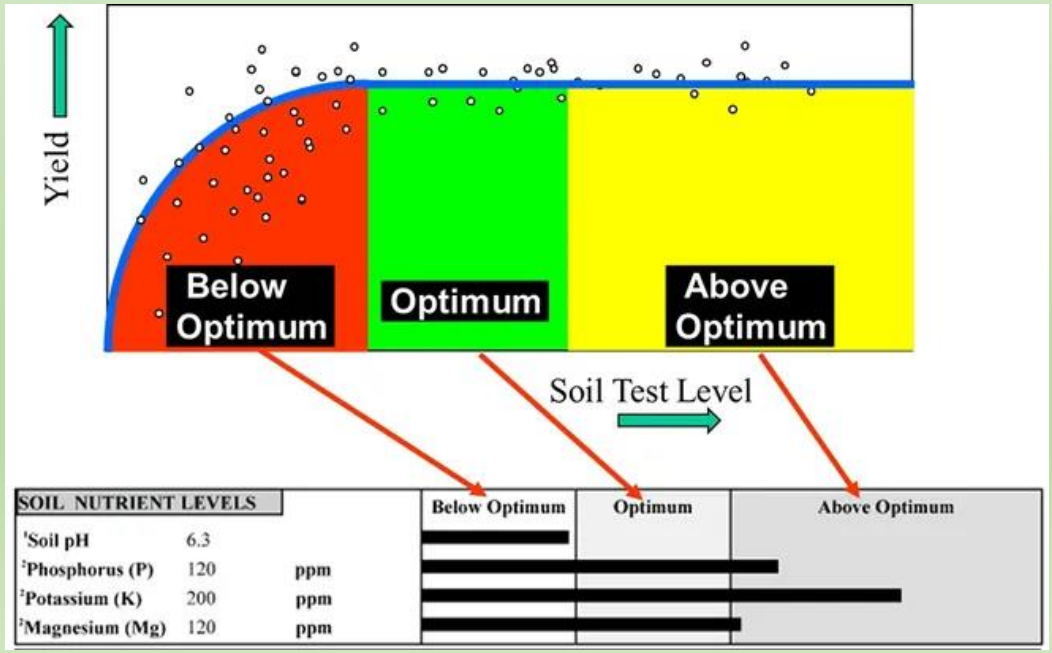
Limestone & Fertilizer Recommendations for Home Vegetable (mixed)

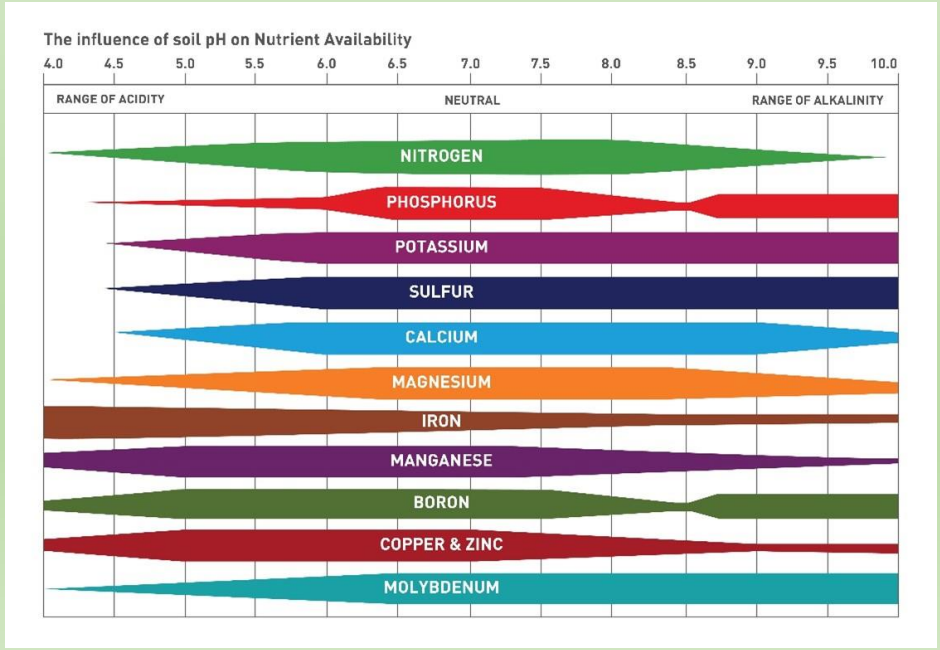
Limestone (Target pH of 6.6)

175 lbs / 1000 sq ft

Importance of a Soil Test: The Numbers

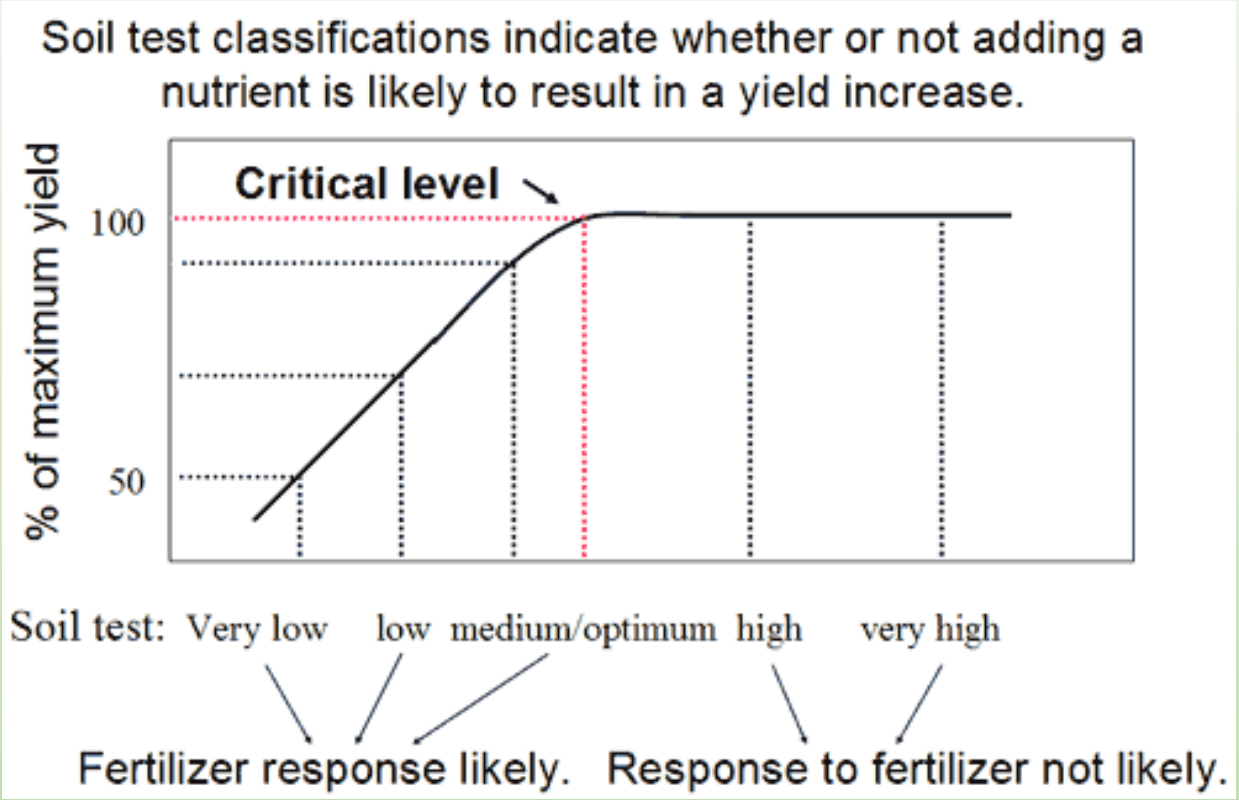
- **Identifies Nutrient Levels:** It measures essential nutrients like nitrogen, phosphorus, potassium, and micronutrients, showing what's sufficient or deficient. This guides precise fertilizer application to meet crop needs.
- **Determines Soil pH:** Soil tests reveal pH levels, which affect nutrient availability. For example, overly acidic or alkaline soil can lock up nutrients, stunting growth. Farmers can apply lime or sulfur to correct pH.





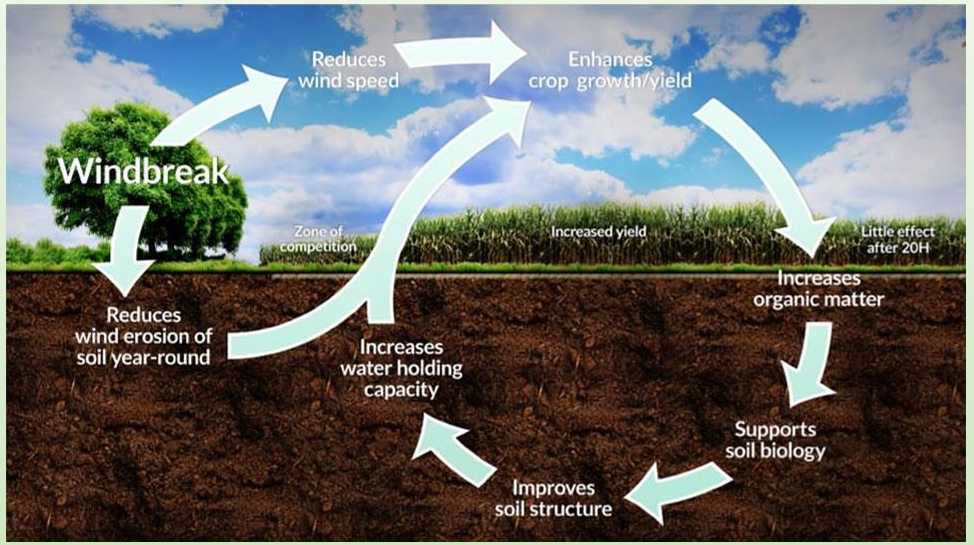
Importance of a Soil Test: Grower Benefits

- **Improves Crop Yields:** By addressing deficiencies and optimizing soil conditions, crops grow healthier and produce higher yields, maximizing farm output.
- **Saves Money:** Testing prevents overuse of fertilizers or amendments, reducing input costs. Farmers apply only what's needed, avoiding waste.
- **Supports Precision Agriculture:** Soil tests provide data for variable-rate fertilizer applications, tailoring inputs to specific field zones for efficiency.



Importance of a Soil Test: Environment Benefits

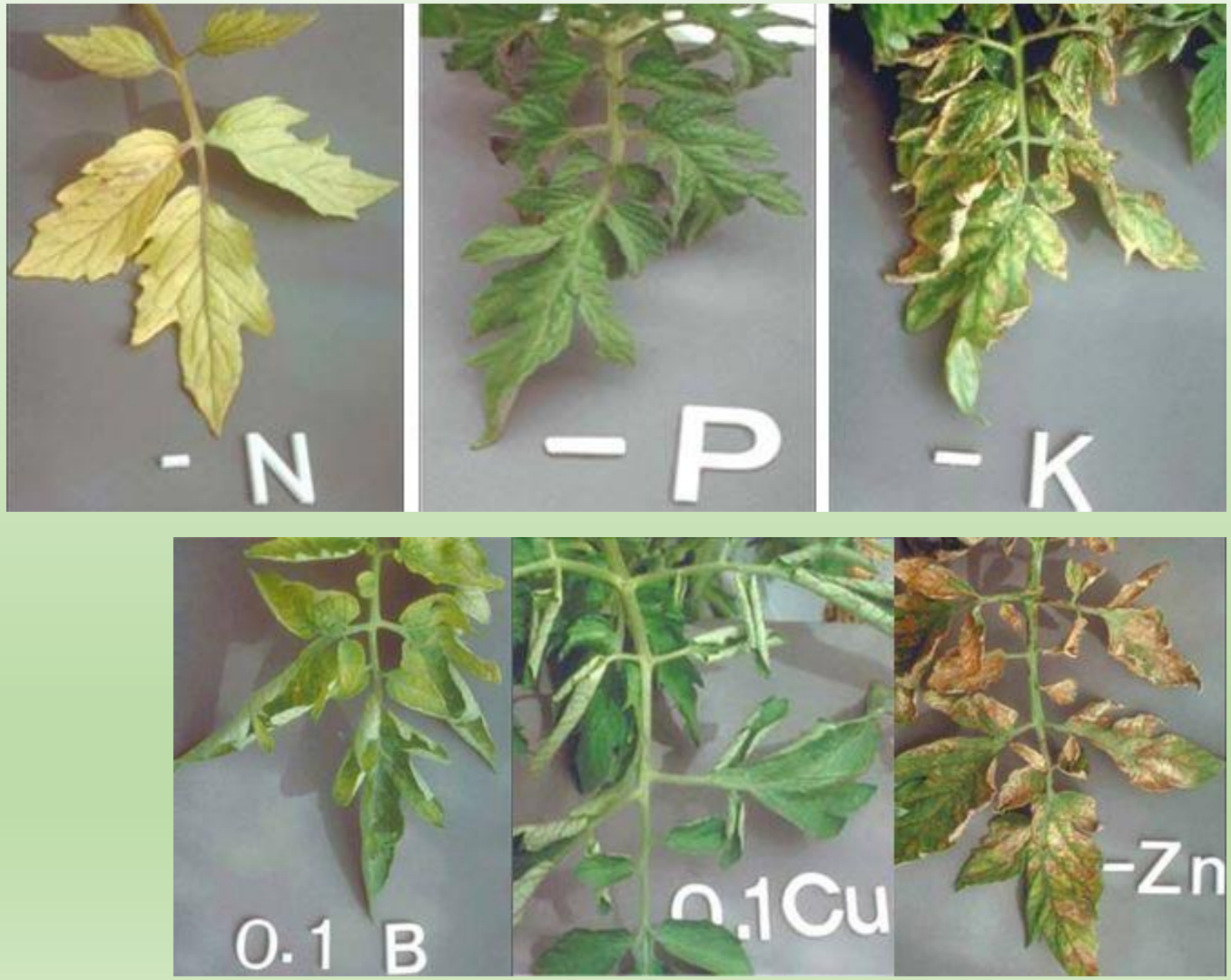
- **Prevents Environmental Harm:** Over-fertilization can cause nutrient runoff, polluting water sources.
  - Soil tests ensure responsible application, minimizing environmental impact.



- **Monitors Soil Health:** Regular testing tracks changes in fertility and structure, helping farmers maintain long-term soil productivity and avoid degradation.

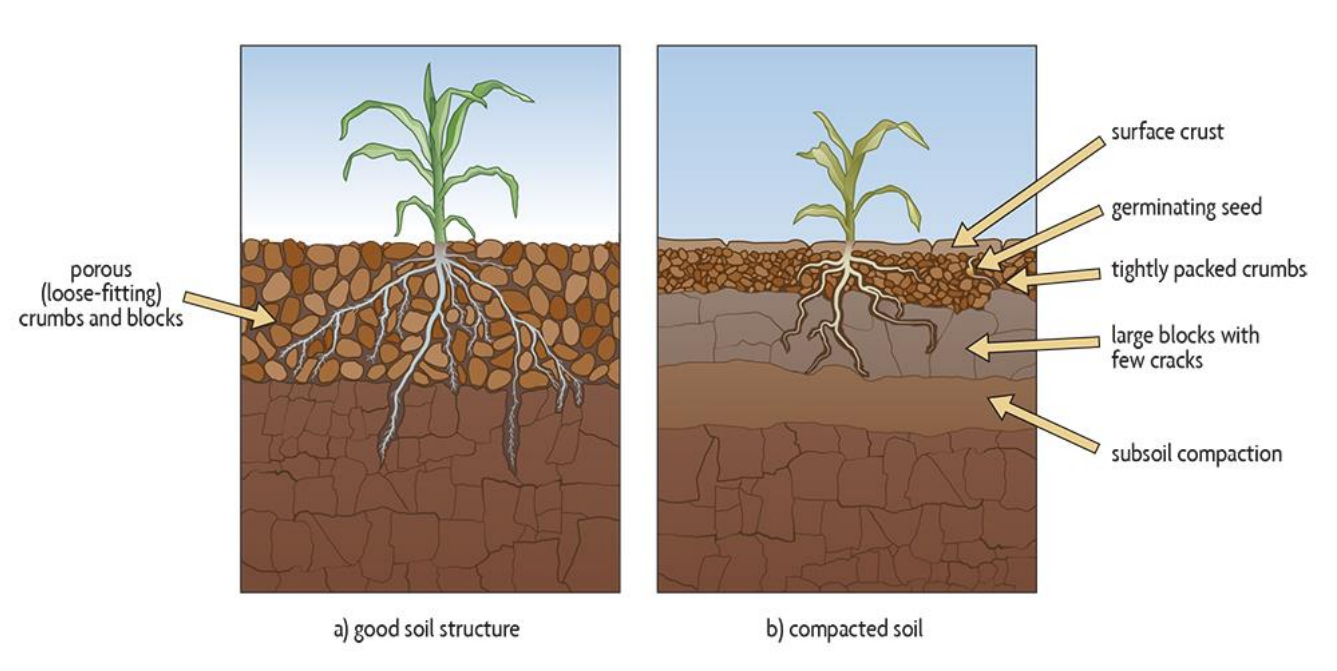
Being Attentive is Key: Early Nutrient Deficiencies

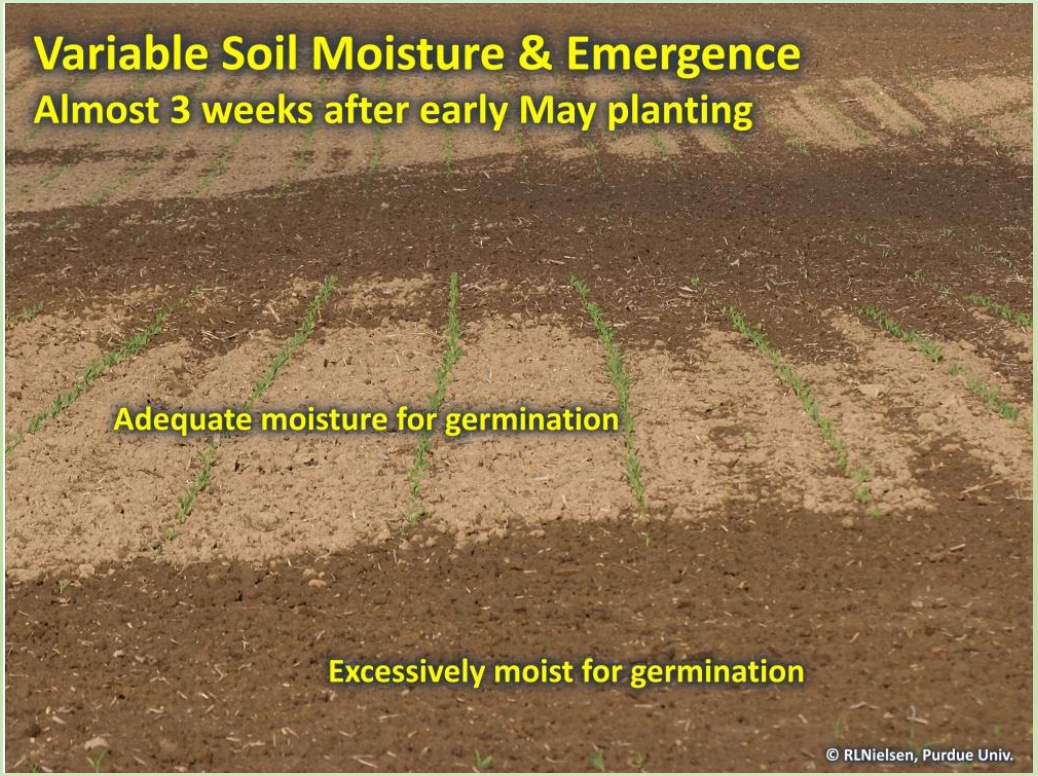
- **Early Nutrient Deficiencies**: Subtle signs like slight yellowing (chlorosis) or stunted growth can be mistaken for normal variation or water stress.
- For example, early nitrogen or micronutrient (ex. zinc, magnesium) deficiencies may not show dramatic symptoms until they worsen.



Being Attentive is Key: Soil Related Issues

- **Soil Related Issues**: Growers may overlook soil issues like compaction, poor drainage, or pH imbalances, which affect root health and nutrient uptake.
- These are hard to spot above ground without soil testing or root inspection.





Being Attentive is Key: Hidden Pests

- **Hidden Pests**: Small or nocturnal pests (spider mites, root aphids, or larvae) and those under leaves or in soil (root-knot nematodes) are often missed.
- Early infestations may lack obvious damage, delaying detection.

Being Attentive is Key: Uniform Problems

- **Uniformity Across Fields**: Growers may focus on problem areas and miss gradual variations in plant vigor or soil conditions across a field, which could indicate uneven irrigation, fertility, or pest pressure.

Cultural Practices to Help Keep Early-Season Pests in Check?

- **Presented by Prof. DeBacco**

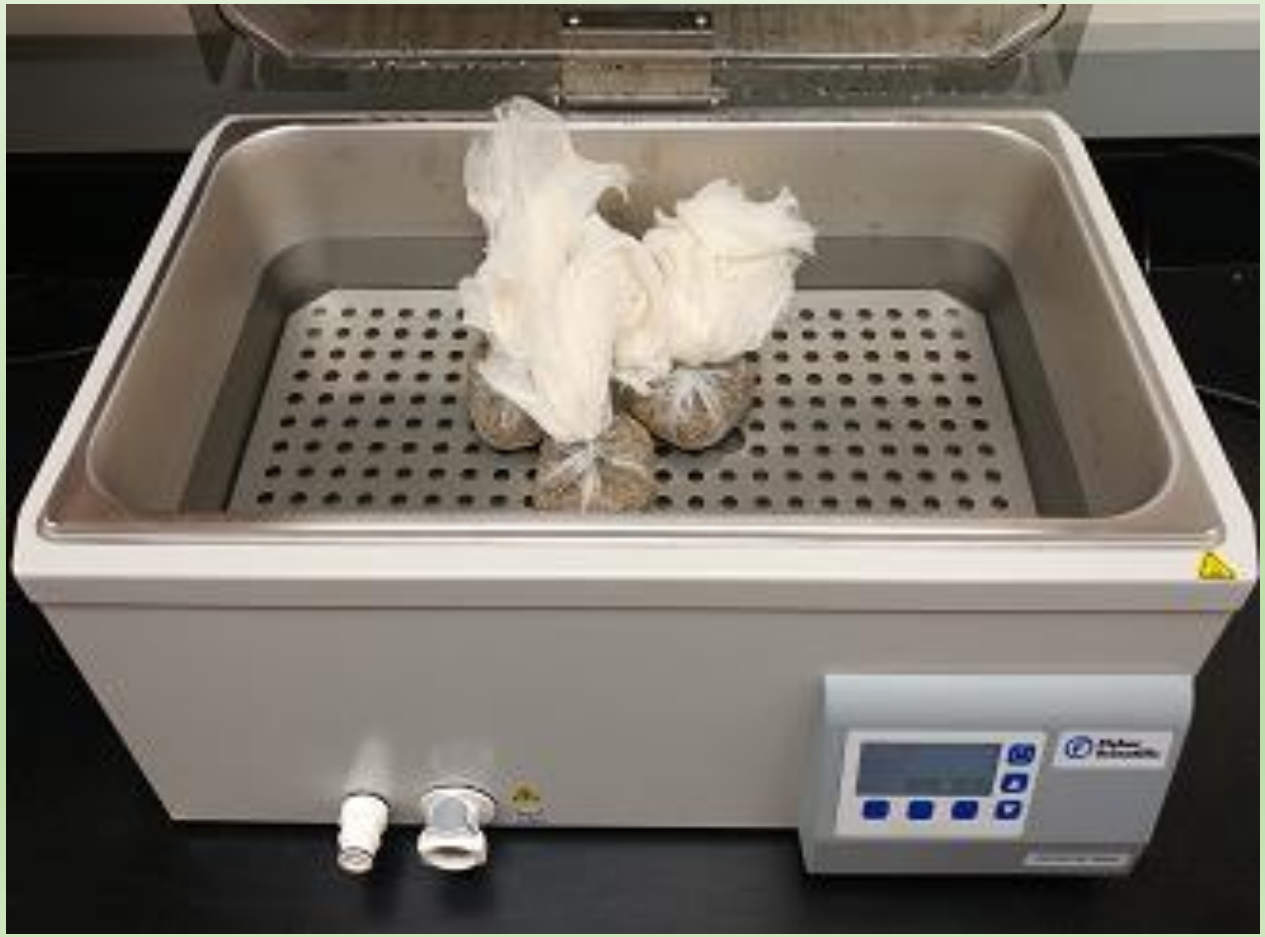
Hot Water Seed Treatments

- Brassicas -Black rot and Fusarium prevention/control/mitigation by using hot water treatment on seeds,

Hot Water and Chlorine Treatments to Eradicate Bacterial Plant Pathogens from Vegetable Seeds

Table 1. Hot Water Treatment.

Seed	Water Temperature		Minutes
	F	C	
Brussels sprouts, eggplant, spinach, cabbage, tomato	122	50	25
Broccoli, cauliflower, carrot, collard, kale, kohlrabi, rutabaga, turnip, cucumber	122	50	20
Mustard, cress, radish	122	50	15
Pepper	125	51	30
Lettuce, celery, celeriac	118	47	30



Row Covers

- Immediate row cover on alliums to help with Allium Leaf Miner
- Row cover garlic in March/April before emergence

Plastic Mulch Color Selection

- **Black Mulch**: **Soil Warming**: Absorbs solar radiation, increasing soil temperature by 5-9°F (3-5°C), which promotes faster root growth and early-season development, especially for warm-season crops like tomatoes or peppers.
- **Silver Mulch**: **Pest Repellence**: Reflects UV light, disorienting and repelling pests like aphids, whiteflies, and thrips, reducing the need for pesticides.
- **White Mulch**: **Soil Cooling**: Reflects most solar radiation, keeping soil temperatures 3-7°F (2-4°C) cooler than bare soil, ideal for cool-season crops like lettuce or in hot climates to prevent heat stress.

Reflective Mulches

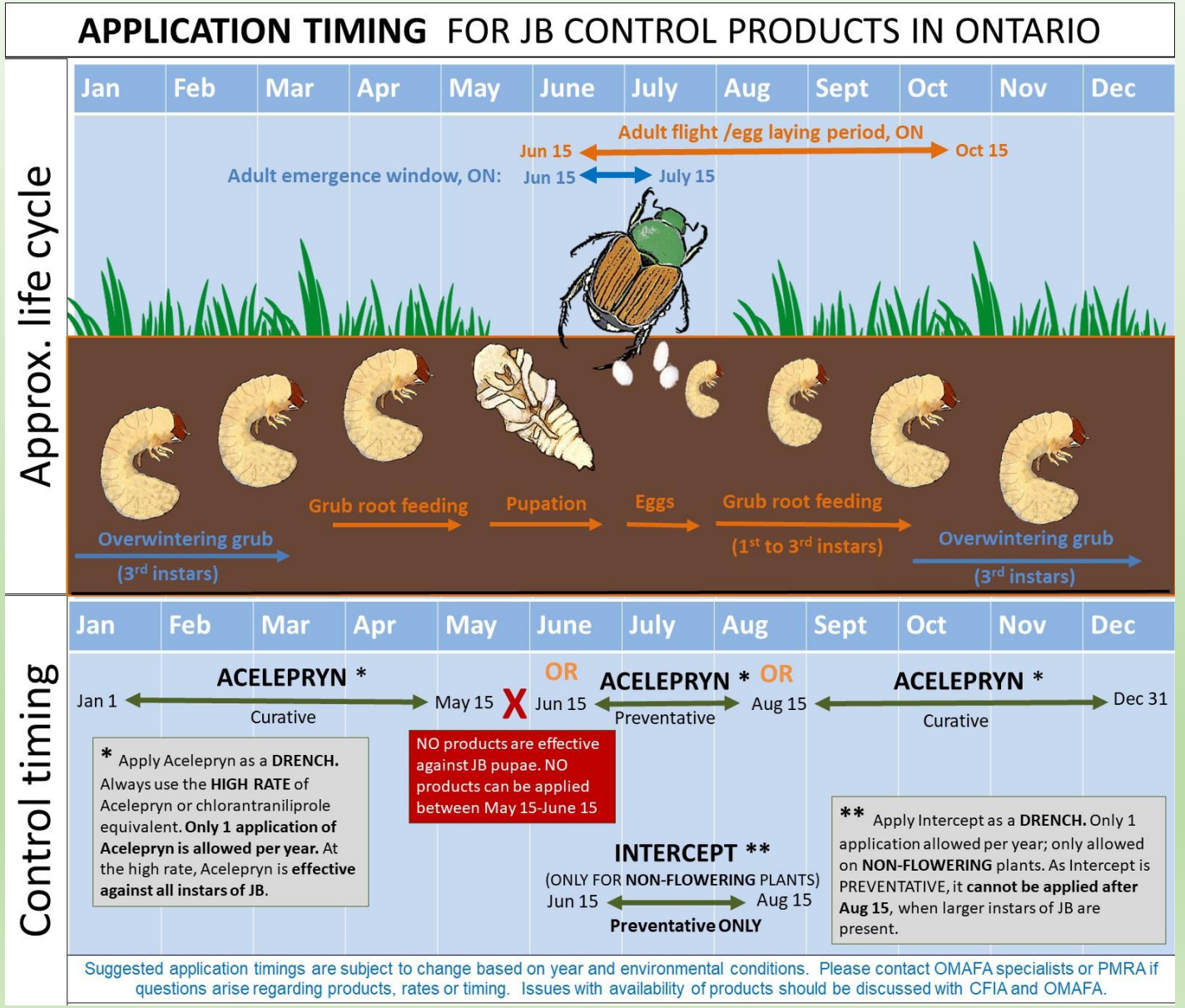
- **Pest Repellence**: Reflective mulches deter pests like aphids, whiteflies, and thrips by reflecting sunlight, disorienting them, and reducing their ability to locate plants.
- This addresses scouting oversights, as small or early-stage pest infestations are often missed.
- By reducing pest pressure, reflective mulches complement soil testing, which ensures plants are nutritionally robust to withstand minor pest damage.

Advice When it Comes to Rotating Insecticides?

- **Presented by Prof. DeBacco**

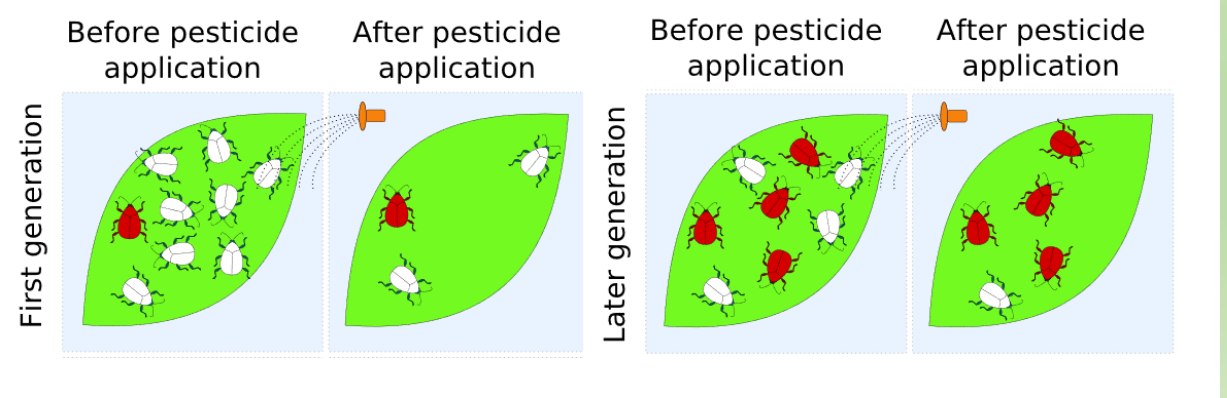
Product and Timing

- Preventative sprays for fungal/bacterial diseases on leaf surface.
- Timing has to be good for prevention and knowing when to spray is important



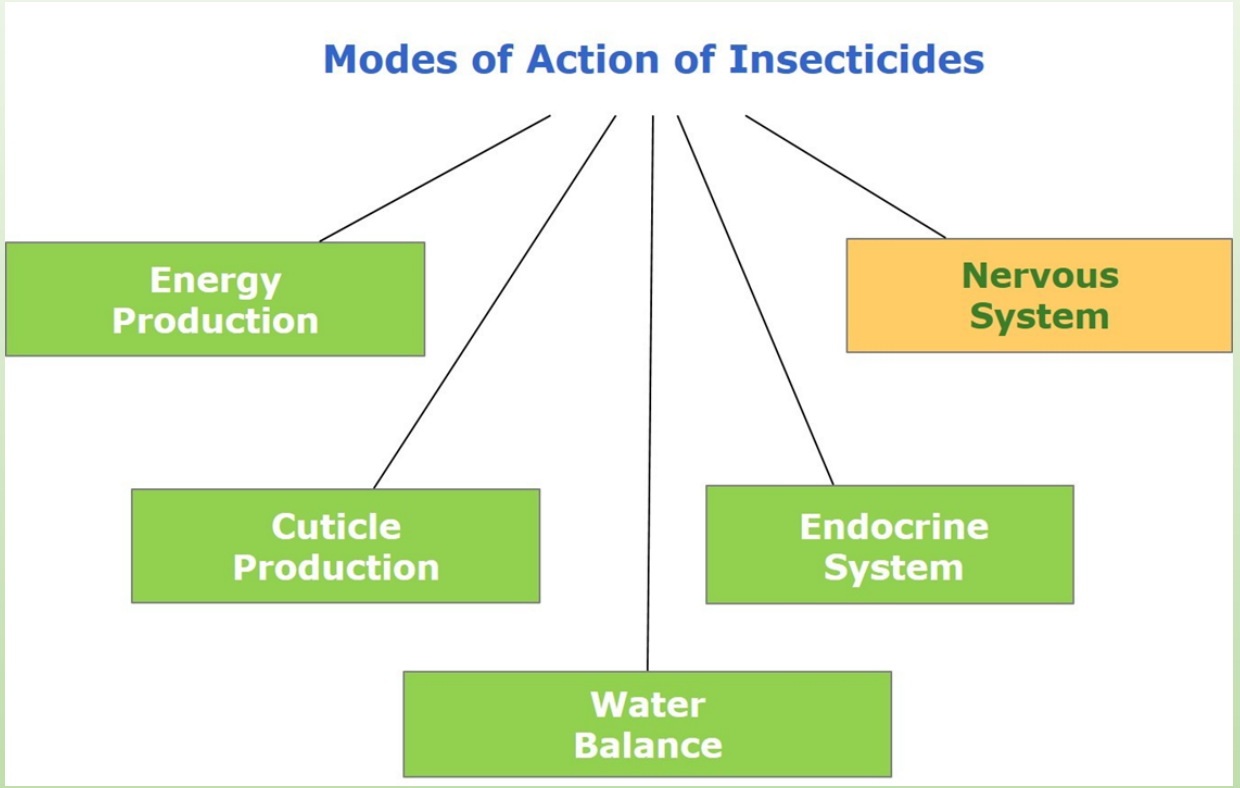
Why Rotate Insecticides?

- **Prevent Resistance**: Repeated use of the same insecticide or mode of action (MoA) can lead to pest populations developing resistance, reducing efficacy.
  - For example, pests like aphids or whiteflies can quickly adapt to overused chemicals.
- **Broad-Spectrum Protection**: Different insecticides target pests at various life stages (ex. eggs, larvae, adults) or in different ways (contact vs. systemic), improving overall control.
- **Protect Beneficial Insects**: Rotating with selective insecticides minimizes harm to pollinators (ex. bees) and natural predators (ex. ladybugs, parasitic wasps).
- **Regulatory Compliance**: Some regions have restrictions on repeated use of certain insecticides to reduce environmental impact.



Key Principles for Insecticide Rotation

- **Rotate by Mode of Action (MoA)**: The MoA describes how an insecticide kills or controls pests (ex. nerve poison, growth regulator, metabolic disruptor). Rotate insecticides with different MoA groups, as classified by the **Insecticide Resistance Action Committee (IRAC)**.
- Example: Rotate a neonicotinoid (IRAC Group 4A, imidacloprid) with a spinosyn (Group 5, spinosad) to target aphids or whiteflies differently.
- Avoid rotating within the same MoA group, as pests resistant to one chemical may resist others in the same group.

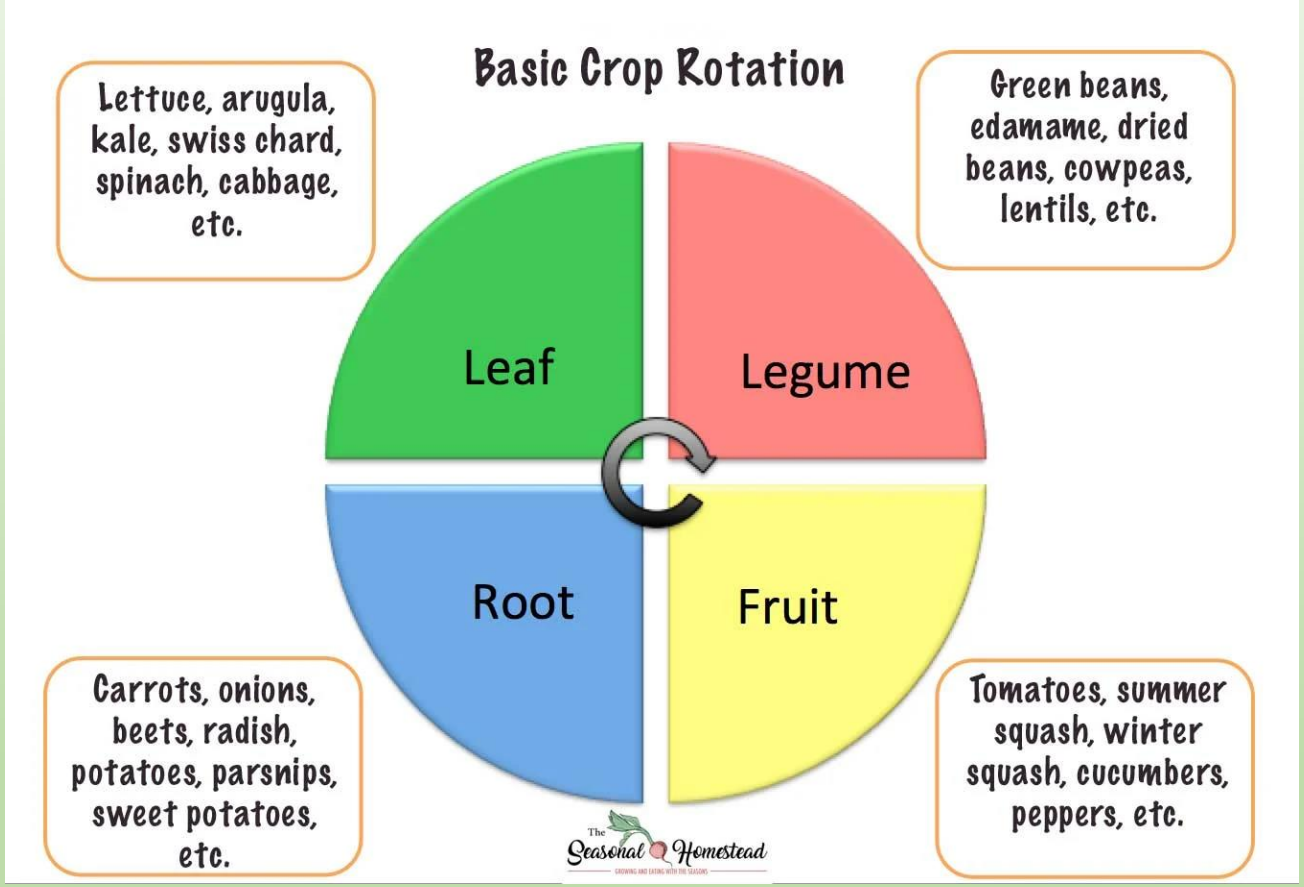


Selective Insecticides

- **Incorporate Selective Insecticides**: Use selective (narrow-spectrum) insecticides, when possible, to target specific pests and spare beneficials.
  - Example, use **Bacillus thuringiensis (Bt)** (Group 11A) for caterpillars like tomato hornworms without harming pollinators.
- Reserve broad-spectrum insecticides (ex. pyrethroids, Group 3A) for severe infestations to minimize ecological disruption.

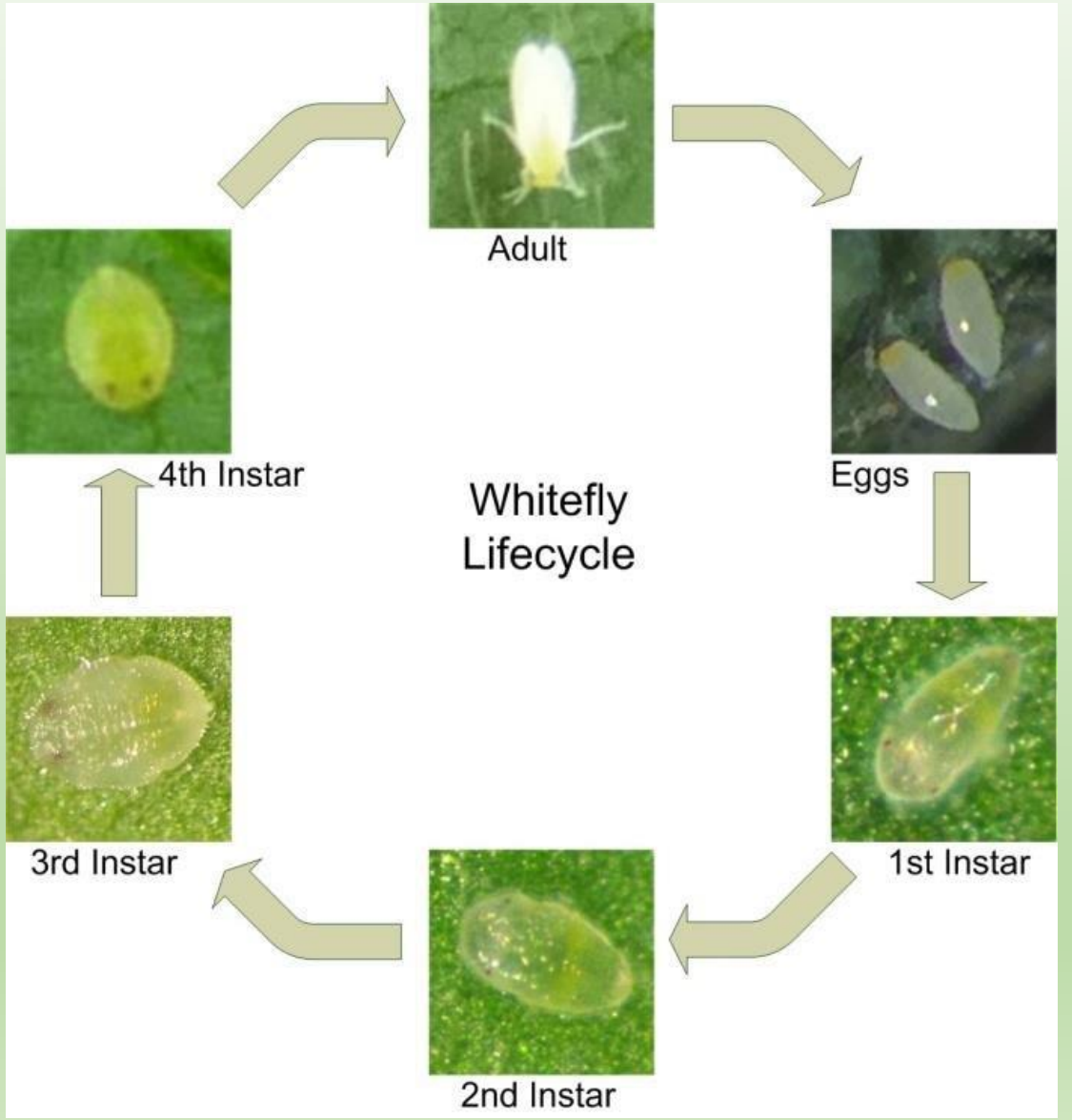
Crop Rotations

- **Integrate Non-Chemical Methods**: Combine insecticide rotation with…
- Cultural practices
  - removing crop residue
- Biological controls
  - releasing predatory mites for spider mites
- Physical barriers
  - row covers to reduce reliance on chemicals



Practical Steps for Rotating Insecticides

- **Identify Target Pests**: Scout regularly to confirm which pests are present (ex. aphids, whiteflies, hornworms, spider mites) and their life stages.
  - Different pests or stages may require specific MoAs.
- Example: For whiteflies, early nymphs are susceptible to insect growth regulators (Group 7C, pyriproxyfen), while adults may need contact insecticides (Group 1B, malathion).



IRAC Classifications

- **Check IRAC Classifications**: Refer to IRAC's MoA classification (available at irac-online.org or on product labels) to select insecticides from different groups. Labels often list the IRAC group number (ex. "Group 5").
- Common tomato pest insecticides by IRAC group:
  - **Group 1B (Organophosphates)**: Malathion for aphids/whiteflies.
  - **Group 3A (Pyrethroids)**: Permethrin for hornworms.
  - **Group 4A (Neonicotinoids)**: Imidacloprid for sucking pests.
  - **Group 5 (Spinosyns)**: Spinosad for caterpillars/thrips.
  - **Group 7C (Juvenile Hormone Mimics)**: Pyriproxyfen for whitefly nymphs.
  - **Group 23 (Lipid Synthesis Inhibitors)**: Spirotetramat for aphids/whiteflies.
  - **Group 28 (Diamides)**: Chlorantraniliprole for caterpillars.

Nematicide Mode of Action Classification Scheme (Version 2.1)

Targeted Physiology: Nerve & Muscle | Growth & Development | Respiration | Unknown or Non-specific

Main Group/Primary Site of Action	Class or Exemplifying active	Active Ingredients	IRAC/FRAC Group
N-1 Acetylcholinesterase (AChE) inhibitors	A Carbamates	Aldicarb, Benfuracarb, Carbofuran, Carbosulfan, Oxamyl	IRAC: 1A
	B Organophosphates	Cadusafos, Ethoprophos, Fenamiphos, Fosthiazate, Imicyafos, Phorate, Terbufos	IRAC: 1B
N-2 Glutamate-gated chloride channel (GluCl) allosteric modulators	Avermectins	Abamectin	IRAC: 6
N-3 Mitochondrial complex II electron transport inhibitors. Succinate -coenzyme Q reductase.	Pyridinyl-ethyl benzamides; Phenethyl pyridineamides	Fluopyram, Cyclobutrifluram	FRAC: 7
N-4 Inhibitors of acetyl CoA carboxylase	Tetronic and Tetramic acid derivatives	Spirotetramat	IRAC: 23
N-UN Compounds with unknown Mode of Action		Furfural, Fluensulfone, Fluazaindolizine, Iprodione	
N-UNX Presumed multi-site inhibitors		1,2-Dibromo-3-chloropropane (DBCP), 1,3-Dichloropropene, Allyl isothiocyanate, Carbon Disulfide, Chloropicrin, Dazomet, Dimethyl Disulfide (DMDS), Ethylene Dibromide, Metam Potassium, Metam Sodium, Methyl Bromide, Methyl Iodide (Iodomethane), Sodium tetrathiocarbonate	IRAC: 8

https://irac-online.org/documents/moa-structures-poster-english/?ext=pdf

Planning Rotations

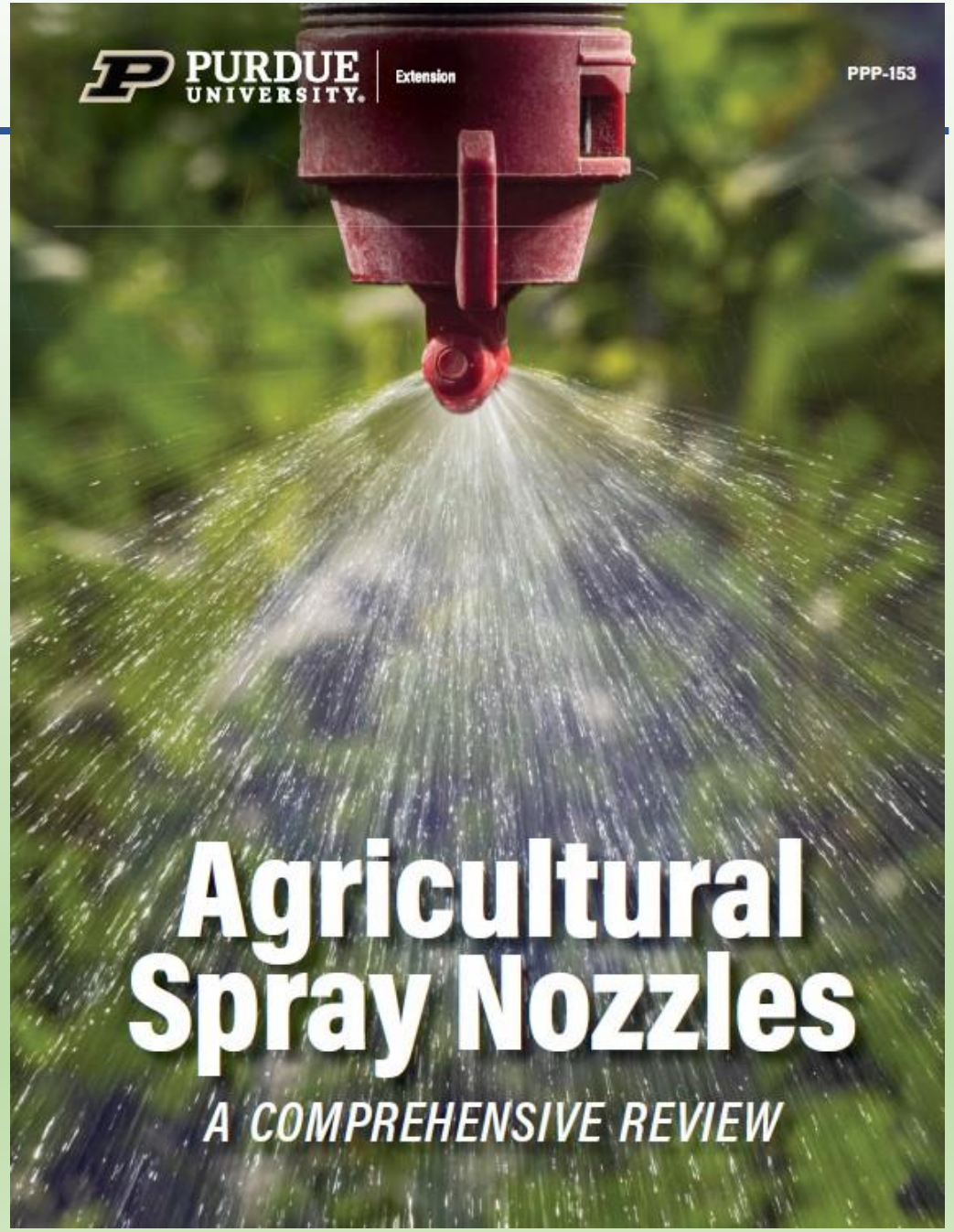
- **Plan a Rotation Schedule**: **Short-Term (Seasonal)**: Alternate at least two to three different MoA groups within a growing season. For example:
  - Week 1: Group 4A (imidacloprid) for aphids.
  - Week 3: Group 23 (spirotetramat) for continued aphid control.
  - Week 5: Group 5 (spinosad) if caterpillars appear.
- **Long-Term (Multi-Season)**: Avoid using the same MoA group in consecutive seasons to prevent resistance buildup.
- Adjust based on pest pressure and life cycles. For pests with overlapping generations (ex. whiteflies), rotate every 2–3 weeks.

Label is the Law

- **Follow Label Guidelines**: Adhere to the maximum number of applications per season and reapplication intervals (ex. 7–14 days) to avoid overuse.
- Check pre-harvest intervals (PHI) to ensure fruit is safe for harvest.
- Example: Imidacloprid may have a 21-day PHI, so plan applications early in fruit development.

Monitoring Results

- **Monitor Efficacy**: After each application, scout within 3–7 days to assess pest control.
- If pest populations persist, consider resistance or improper application (ex. poor coverage, wrong timing).
- Use sticky traps or visual counts to quantify pest reduction.
- *Also for large scale operations spray nozzle selection and calibration are important for efficient coverage.



Local Resources: UConn Extension

- **Consult Local Resources**: Work with local extension services, pest management advisors, regional guidelines, university publications to select effective insecticides and rotations for your area's pest profile.
- Example: In Florida, whitefly resistance to neonicotinoids is common, so rotations with Group 23 or 28 may be prioritized.

Additional Considerations

- **Tank Mixing**: Avoid mixing insecticides with the same MoA, as this doesn't count as rotation and may accelerate resistance. If mixing, ensure MoAs differ and are compatible (check labels).
- **Resistance Management**: If resistance is suspected (ex. poor control despite correct application), stop using the affected MoA and switch to a different group. Test alternative insecticides on a small area first.
- Use insecticides only when pest thresholds are met (ex. 5–10% of plants with aphids) to reduce selection pressure.
- **Environmental Factors**: Apply insecticides during cooler parts of the day (early morning or late afternoon) to maximize efficacy and minimize drift or harm to pollinators.
- Avoid applications before rain or in high winds to ensure proper coverage.
- **Record Keeping**: Log each insecticide used, including MoA group, application date, rate, and target pest. This helps track rotations and identify patterns in resistance or efficacy
- **Beneficial Insect Preservation**: Avoid broad-spectrum insecticides during flowering to protect pollinators.
- Use selective options like **Bt** or insect growth regulators when possible, and time applications to avoid periods when beneficials are active.

Example Rotation Plan for Tomato Pests

Scenario: Mixed pest pressure (aphids, whiteflies, hornworms) in a 12-week season.

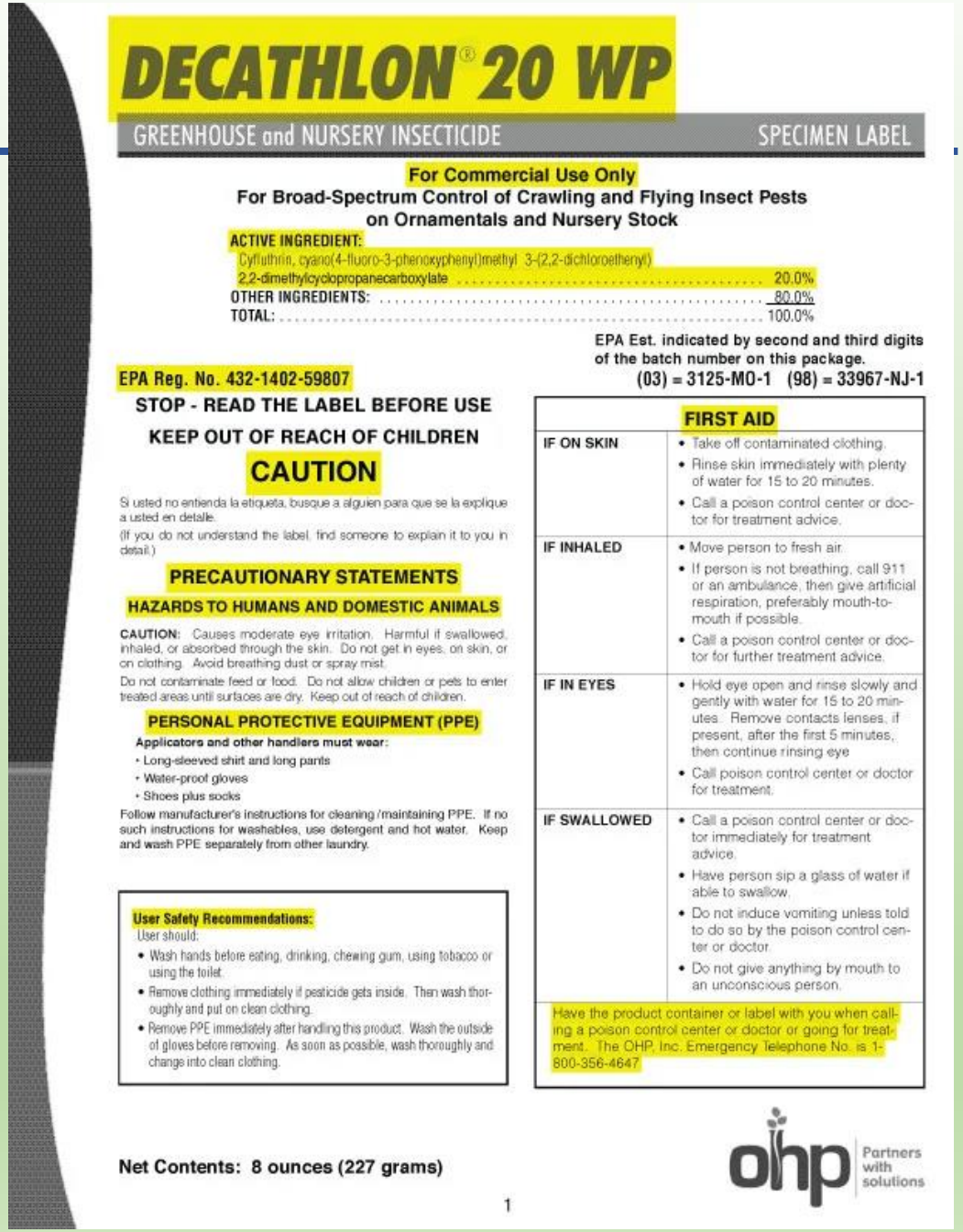
- **Weeks 1–2**: Group 4A (imidacloprid, systemic) for aphids/whiteflies.
- **Weeks 3–4**: Group 7C (pyriproxyfen, growth regulator) for whitefly nymphs.
- **Weeks 5–6**: Group 5 (spinosad, contact) for hornworms.
- **Weeks 7–8**: Group 23 (spirotetramat, systemic) for aphids/whiteflies.
- **Weeks 9–10**: Group 11A (Bt, microbial) for hornworms if needed.
- **Weeks 11–12**: Group 28 (chlorantraniliprole, contact) for caterpillars or lingering pests. *Adjust based on scouting data and pest thresholds.*

Common Mistakes to Avoid

- **Rotating by Brand Name**: Different brands may have the same active ingredient or MoA (ex. multiple neonicotinoids). Always check the IRAC group
- **Overusing Broad-Spectrum Insecticides**: Pyrethroids or organophosphates kill beneficials, leading to secondary pest outbreaks (ex. spider mites).
- **Ignoring Life Stages**: Some MoAs (ex. growth regulators) don't affect adults, so pair with contact insecticides if needed.
- **Neglecting Scouting**: Apply insecticides based on confirmed pest presence, not a fixed schedule.

Final Tips

- **Stay Updated**: Resistance patterns evolve, so check with local agricultural agencies for current recommendations.
- **Test New Products**: Introduce new MoAs gradually, testing on a small area to confirm efficacy.
- **Balance IPM**: Use rotations as part of a broader strategy, including resistant tomato varieties, trap crops, and cultural practices like sanitation.



DECATHLON® 20 WP

GREENHOUSE and NURSERY INSECTICIDE SPECIMEN LABEL

For Commercial Use Only

For Broad-Spectrum Control of Crawling and Flying Insect Pests on Ornamentals and Nursery Stock

ACTIVE INGREDIENT:

Cyfluthrin, cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl) 2,2-dimethylcyclopropanecarboxylate 20.0%

OTHER INGREDIENTS: 80.0%

TOTAL: 100.0%

EPA Est. indicated by second and third digits of the batch number on this package.

(03) = 3125-MO-1 (98) = 33967-NJ-1

EPA Reg. No. 432-1402-59807

STOP - READ THE LABEL BEFORE USE

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entienda la etiqueta, busque a alguien para que se la explique a usted en detalle.

(If you do not understand the label, find someone to explain it to you in detail.)

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Causes moderate eye irritation. Harmful if swallowed, inhaled, or absorbed through the skin. Do not get in eyes, on skin, or on clothing. Avoid breathing dust or spray mist.

Do not contaminate feed or food. Do not allow children or pets to enter treated areas until surfaces are dry. Keep out of reach of children.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Water-proof gloves
- Shoes plus socks

Follow manufacturer's instructions for cleaning /maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations:

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID

IF ON SKIN	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
IF INHALED	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contacts lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call poison control center or doctor for treatment.
IF SWALLOWED	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. The OHP, Inc. Emergency Telephone No. is 1-800-356-4647.

Net Contents: 8 ounces (227 grams)

ohp Partners with solutions

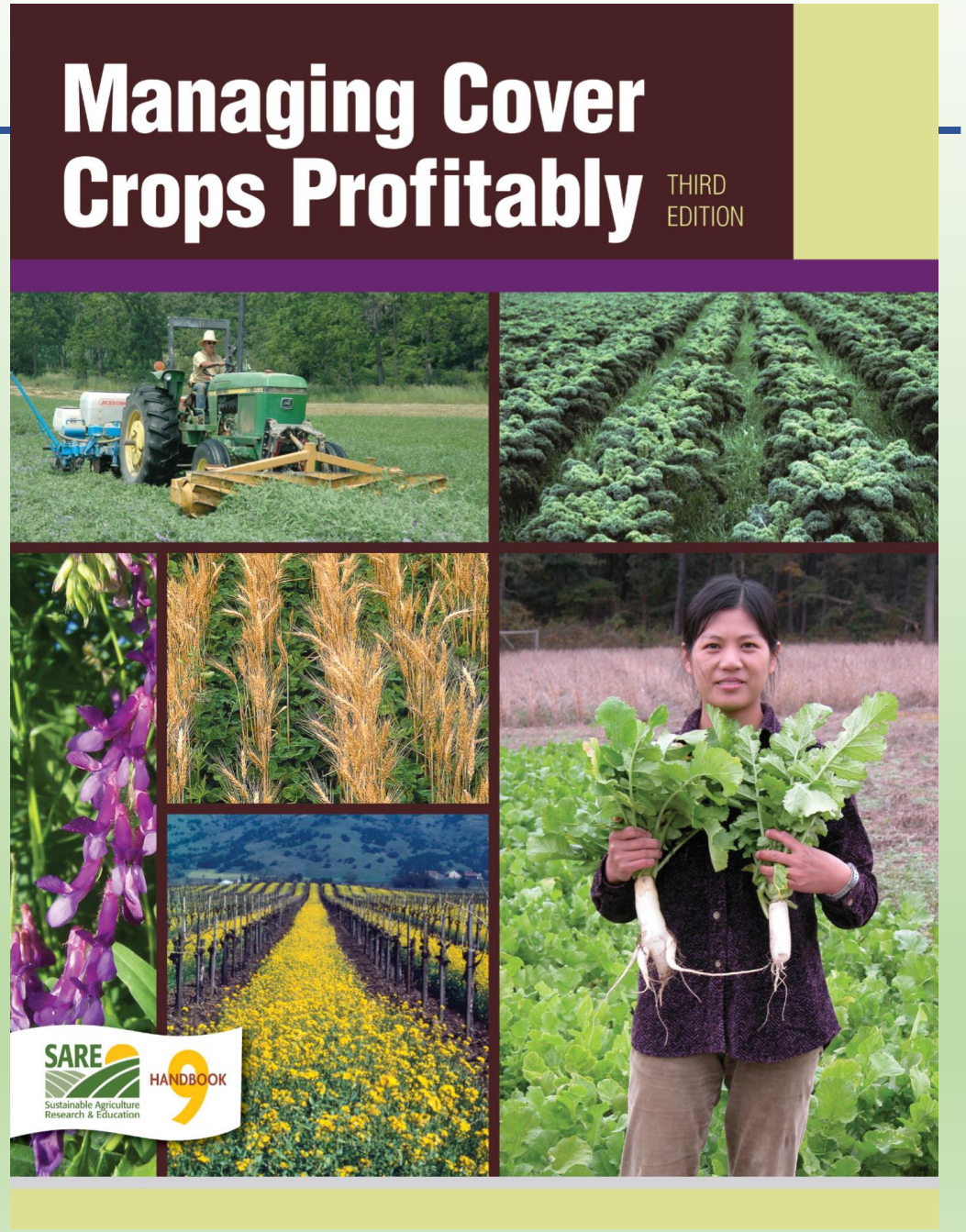
1

Biological Control Options that Work Well Early in the Season?

- **Presented by Prof. DeBacco**

Cover Crops

- Possible use of cover crop like Mustards to help with fungal/insect pressure
- Other cover crop use to increase soil biology and keep soil covered
- https://www.sare.org/wp-content/uploads/Managing-Cover-Crops-Profitably.pdf



Beneficial Insects

- Using beneficial insects/bacteria to combat bad bugs
- Timing has to be right with Nematodes, certain bacteria, etc.
- Insects do best when established with low initial pest populations and when there is a stable environment/food source for them.

Trap Plants

- Using plants as traps or deterrents

Non-Chemical Options for Cucurbits

- https://www.udel.edu/academics/colleges/canr/cooperative-extension/fact-sheets/non-chemical-pest-control-cucurbits/

Cucumber Beetles (spotted and striped)

- For both species, **remove crop debris in the fall** to reduce overwintering sites.
- **Late planting (after June 15) may avoid adults** that have already emerged and dispersed.
- **Handpicking** is difficult because adults are fast and drop when disturbed; however, you may be able to kill dropping beetles by placing a container of soapy water under them.
- **Rotate crops** as much as possible.
- **Commercial or homemade yellow sticky traps, with or without chemical attractants,** can kill adult beetles.

Squash bug

- **Row covers** can prevent egg laying; however, plants may be colonized when covers are removed (necessary when plants bloom for pollination).
- Can **delay planting** squash until the early months of summer to avoid overwintered adult squash bugs seeking host plants.
- Egg clusters are difficult to crush; you may need to tear out a small piece of leaf.
- Nymphs are very gregarious and usually feed on the undersides of plants.
    - Use a **piece of duct tape wrapped around fingers (sticky side out)** to trap nymphs; flick them into soapy water; or use a finger gripper (for handling paper) to squash and remove eggs and nymphs.
- Adults can be found congregating on plant stems at the soil level. **Place boards on soil near the plant; check for congregating adults and nymphs, and destroy in the morning** (crush between two hard surfaces).
- **Remove plant debris** during the season to reduce hiding places and in fall to reduce overwintering sites.
- **Practice crop rotation** to reduce spring infestations

Squash Vine Borer

- If you suspect an infestation, you can use a garden syringe to **inject the bacterial insecticide Bt** (*Bacillus thuringiensis*) into the base of the stems. Larvae that ingest Bt will die. It can also be sprayed on stems as a preventive, killing newly hatched larvae before they bore into the stems.
- You can **physically remove larvae** from the stem.
  - Follow the frass to the borer hole. With a sharp knife, carefully slit the vine lengthwise, and remove and destroy the borer.
  - Check closely for multiple borers. Immediately cover the slit stem with soil to encourage rooting and healing.
- Mulch or bury the squash plant's nodes as stems lengthen to encourage rooting, which may limit damage from larval boring.

Key Decisions After Transplanting to Stay Ahead of Pests?

- **Presented by Prof. DeBacco**

Watering and Irrigation

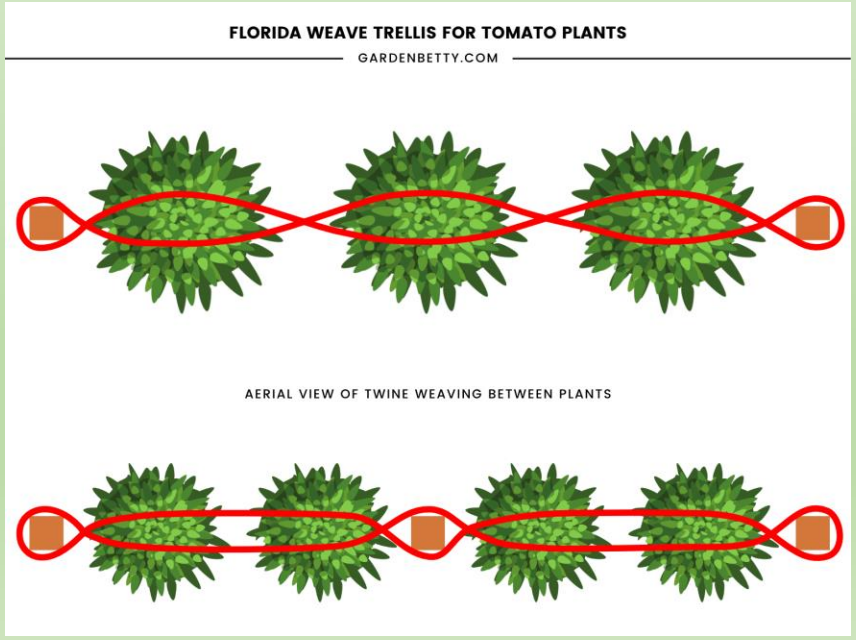
- **Immediate Watering**: Water thoroughly right after transplanting to settle soil around roots, eliminate air pockets, and reduce transplant shock. Use enough water to moisten the root zone (about 6–8 inches deep).
- **Maintain Consistent Moisture**: Keep soil evenly moist but not waterlogged for the first 1–2 weeks. Tomatoes need about 1–2 inches of water per week, depending on soil type and weather.
  - **Check Soil**: Use a finger test or moisture meter to ensure the top 1–2 inches of soil remain slightly moist.
  - **Avoid Overwatering**: Soggy soil can cause root rot or fungal issues like damping-off.
- **Irrigation Method**: Use drip irrigation or soaker hoses to deliver water directly to the root zone, minimizing leaf wetness and disease risk. If overhead watering, do so early in the day to allow foliage to dry.

Protecting Transplants from Environmental Stress

- **Reduce Transplant Shock**:
  - **Hardening Off**: If not done before transplanting, gradually acclimate plants to outdoor conditions over 7–10 days prior to transplanting to strengthen them.
  - **Shade Protection**: Use shade cloth, row covers, or temporary covers (ex. cardboard) for 3–5 days to shield transplants from intense sun or wind, especially in hot or dry climates.
- **Temperature Management**:
  - Protect from cold snaps (below 50°F/10°C) using row covers, cloches, or frost blankets, as tomatoes are sensitive to low temperatures.
  - In hot weather (above 90°F/32°C), ensure adequate water and shade to prevent wilting or sunscald on young plants.
- **Wind Protection**: Stake or use windbreaks to prevent stem damage in windy areas, especially for tall or leggy transplants.

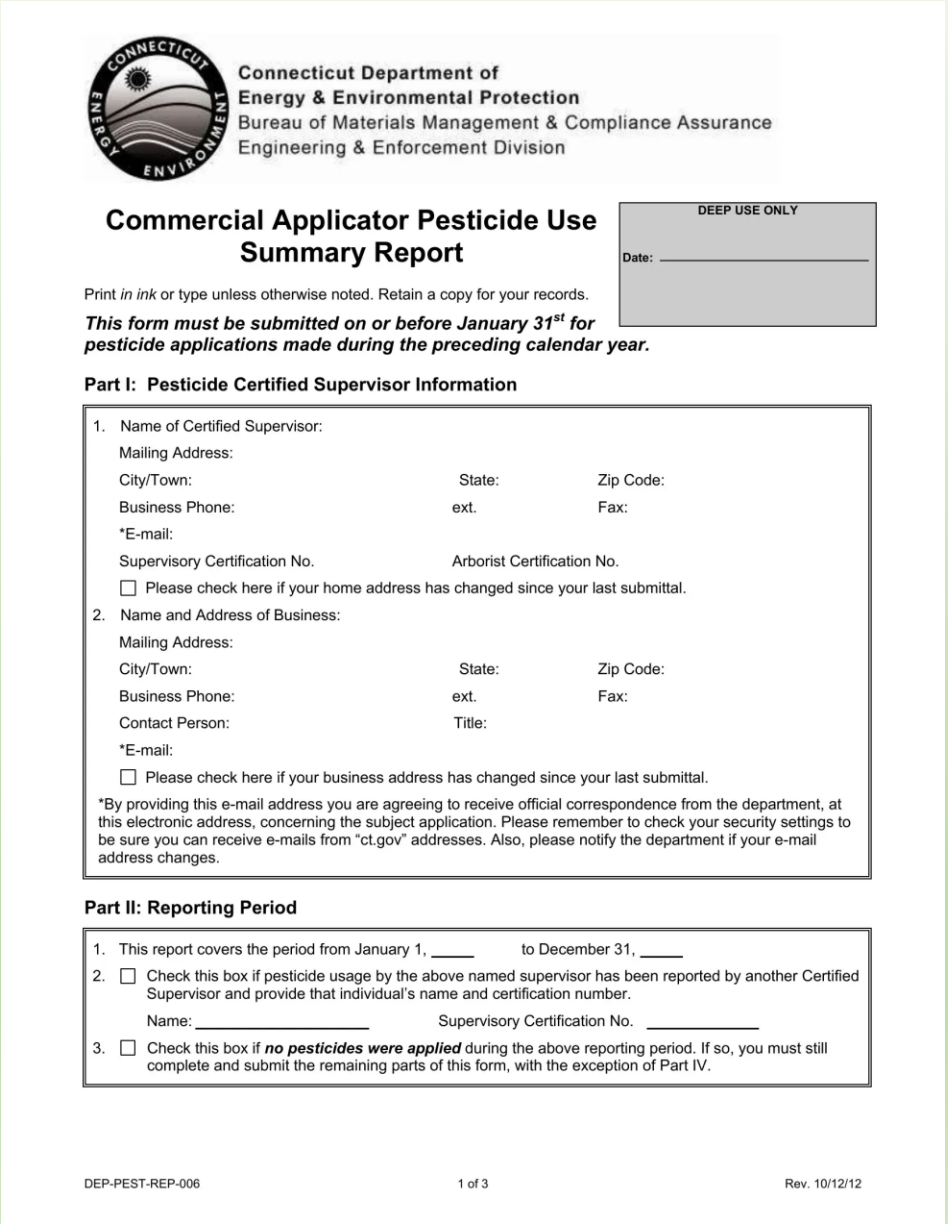
Tomato Support

- **Install Support Early**: Set up stakes, cages, or trellises within 1–2 days of transplanting to avoid disturbing roots later and to prevent wind damage.
- **Install Stakes**: Place a sturdy stake at each end of the row, driving it 12-18 inches into the ground for stability.
- Add additional stakes every 2-4 plants (roughly every 4-6 feet) along the row. For example, if you have 10 plants, you might use 3-4 stakes total.
- Ensure stakes are tall enough to support plants as they grow (5-6 feet above ground for indeterminate varieties)



Record Keeping and Adjustments

- **Log Observations**: Record transplant date, weather, watering schedule, and any pest/disease issues to track plant progress and refine practices for future seasons.
- **Adjust Based on Scouting**: If scouting reveals issues (ex. nutrient deficiency, pest buildup), take targeted action (ex. foliar sprays, beneficial insect releases) rather than broad treatments.
- **Consult Experts**: If plants show persistent problems (ex. wilting despite care), contact local extension services or send samples to a plant diagnostic lab for analysis.



Connecticut Department of
Energy & Environmental Protection
Bureau of Materials Management & Compliance Assurance
Engineering & Enforcement Division

Commercial Applicator Pesticide Use Summary Report

DEEP USE ONLY
Date: _____

Print *in ink* or type unless otherwise noted. Retain a copy for your records.

This form must be submitted on or before January 31st for pesticide applications made during the preceding calendar year.

Part I: Pesticide Certified Supervisor Information

1. Name of Certified Supervisor:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext. Fax:
   *E-mail:
   Supervisory Certification No. Arborist Certification No.
   ☐ Please check here if your home address has changed since your last submittal.
2. Name and Address of Business:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext. Fax:
   Contact Person: Title:
   *E-mail:
   ☐ Please check here if your business address has changed since your last submittal.

*By providing this e-mail address you are agreeing to receive official correspondence from the department, at this electronic address, concerning the subject application. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

Part II: Reporting Period

1. This report covers the period from January 1, ____ to December 31, ____
2. ☐ Check this box if pesticide usage by the above named supervisor has been reported by another Certified Supervisor and provide that individual's name and certification number.
   Name: _____ Supervisory Certification No. _____
3. ☐ Check this box if ***no pesticides were applied*** during the above reporting period. If so, you must still complete and submit the remaining parts of this form, with the exception of Part IV.

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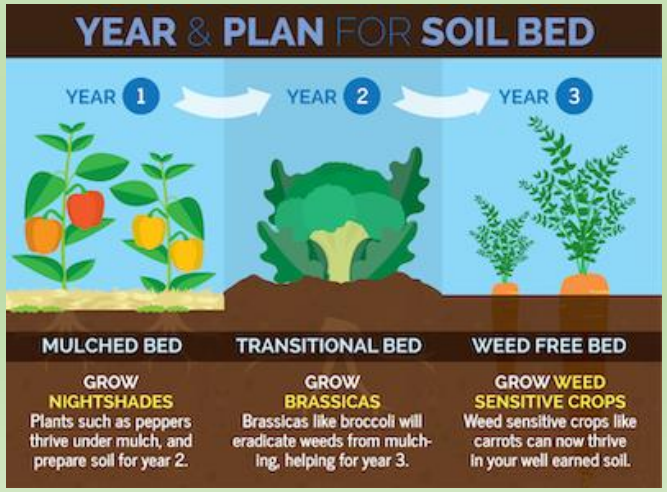
Long-Term Planning

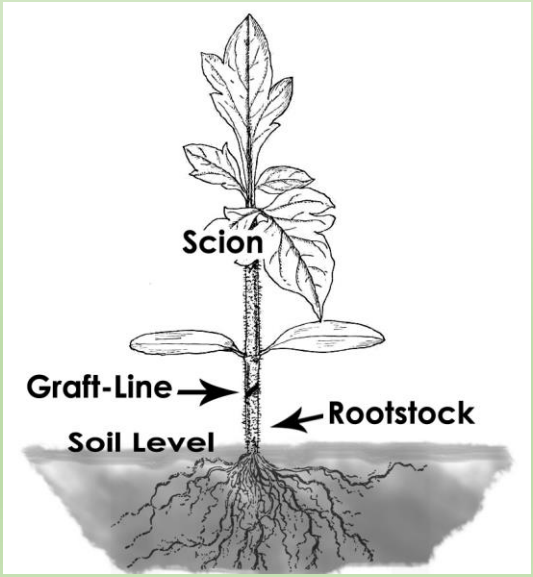
- **Crop Rotation**: Plan to rotate tomatoes with non-solanaceous crops (ex. legumes, brassicas) in future seasons to reduce soil-borne diseases like Fusarium wilt.
- **Variety Selection**: Note how current varieties perform under local conditions and consider disease-resistant varieties (ex. ‘Defiant’ for blight) for next season.
- **Soil Health**: Incorporate cover crops or organic matter post-harvest to improve soil structure and fertility for future tomato crops.



Variety	Fusarium	Verticillium	Tobacco Mosaic	Nematodes	Blight	BER
‘Gladiator’						●
‘Oh Happy Day’					●	
‘SuperSauce’	●	●				
‘Fourth of July’	●	●	●	●		
‘Sun Gold’	●	●				
‘Madame Marmande’	●	●				
‘Sweet Seedless’	●	●		●		
‘Super Sweet 100’	●	●		●		
‘Bush Early Girl’	●	●	●	●		
‘Patio Princess’	●					
‘Porterhouse’	●	●				
‘Druzba’						●
‘Better Boy’	●	●		●		
‘Umamin’	●	●	●	●		
‘Big Daddy’	●	●				
‘Burpee’s Supersteak’	●	●		●		
‘Rutgers’	●	●				
‘Big Beef’	●	●	●	●		
‘Bush Big Boy’	●	●	●	●		
‘German Pink’						●
‘Mountain Magic’	●	●			●	
‘Steak Sandwich’	●	●	●			
‘Yellow Pear’	●	●				
‘Italian Ice’	●			●		
‘Sweet Tangerine’	●	●	●	●		
‘Summer Girl’	●	●				
‘Burpee’s Burger’			●			
‘Celebrity’	●	●	●	●		
‘Supertasty’	●	●	●	●		
‘Sweetheart of the Patio’	●	●			●	
‘Cloudy Day’					●	

Common Mistakes to Avoid

- **Overwatering**: Leads to root rot or fungal diseases. Check soil moisture before watering.
- **Neglecting Support**: Delaying staking/caging can damage roots or cause plants to sprawl, increasing disease risk.
- **Over-Fertilizing**: Excess nitrogen causes lush foliage but poor fruit set. Follow soil test recommendations.
- **Ignoring Pests Early**: Small infestations (ex. aphids) can explode if not addressed promptly.
- **Planting Too Deep or Shallow**: Ensure the root ball is buried and the stem is covered up to the first true leaves for stability, but avoid burying too deep in heavy soils.
- *Do not plant the graft union below the soil line.
  - Suggested to leave about 2” gap to the soil level to ensure there are no adventurous roots that form.



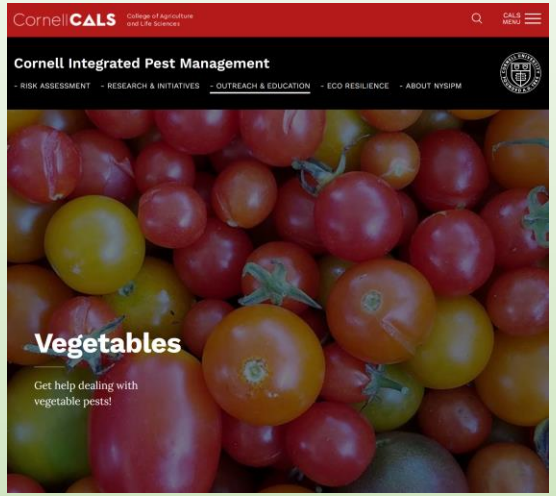
Go-to Tools, Scouting Guides, or Threshold Charts that you Recommend?

- **Presented by Prof. DeBacco**

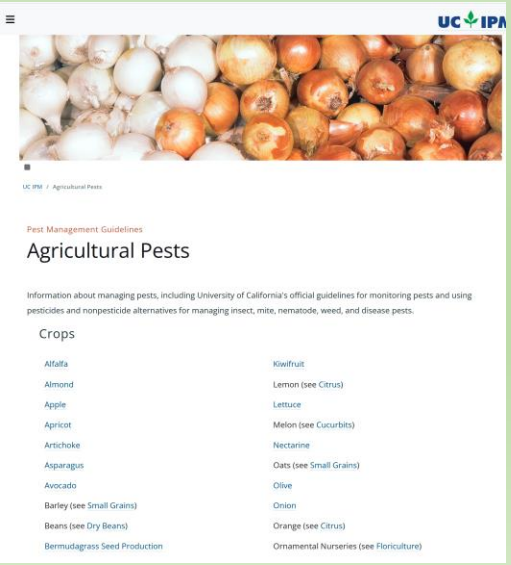
University and Extension Service Resources

University and Extension Service Resources

University cooperative extension programs provide science-based, region-specific scouting guides and pest management resources for tomato growers. These are often free and accessible online.

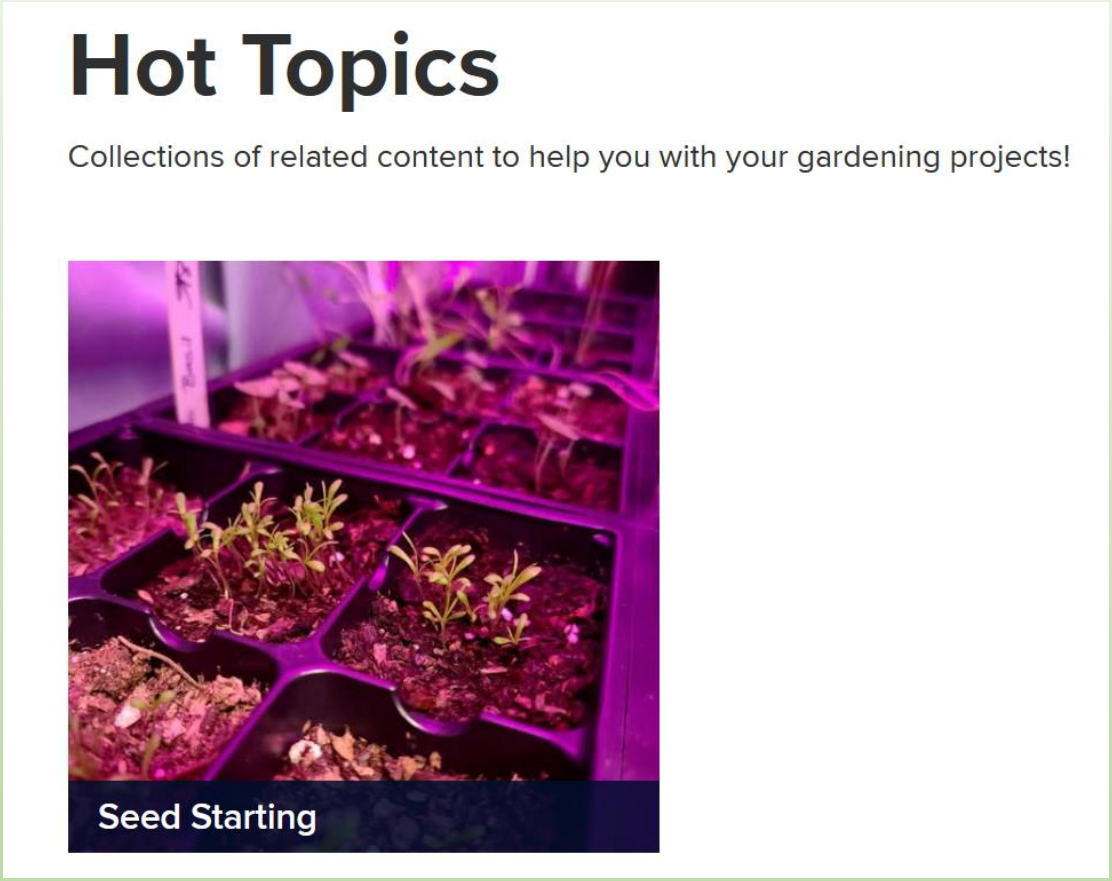


- **Cornell University Cooperative Extension**
  - **Resource**: *Integrated Pest Management for Tomatoes* (Cornell IPM Program)
  - **Description**: Offers detailed guides on scouting for pests (ex. aphids, hornworms), diseases (early blight, late blight), and nutrient issues. Includes identification photos, scouting protocols, and thresholds for action.
  - **Access**: Visit https://cals.cornell.edu/integrated-pest-management/outreach-education/ipm-areas/vegetable-ipm
  - **Region**: Best for Northeast U.S., but broadly applicable.
- **University of California Agriculture and Natural Resources (UC ANR)**
  - **Resource**: *UC IPM Online: Tomato Pest Management Guidelines*
  - **Description**: Comprehensive guide covering scouting techniques, pest and disease identification, and management for tomatoes. Includes color photos, life cycle details, and monitoring tips for pests like whiteflies and spider mites.
  - **Access**: Available at https://ipm.ucanr.edu/agriculture/#gsc.tab=0
  - **Region**: Focused on California but widely relevant for warm climates.



Coming This Growing Season from UConn

- **University of Connecticut Cooperative Extension**
  - **Resource**: *Broad Resource of Fact Sheets*
  - **Description**: Contains information on a range of topics that includes fruit, household plants, lawns, ornamentals, vegetables, and “Hot Topic” section.
  - **Access**: Visit https://homegarden.cahnr.uconn.edu/factsheets/ to access the topic of most interest to you.
  - **Region**: Best for Connecticut/Northeast U.S., but broadly applicable.

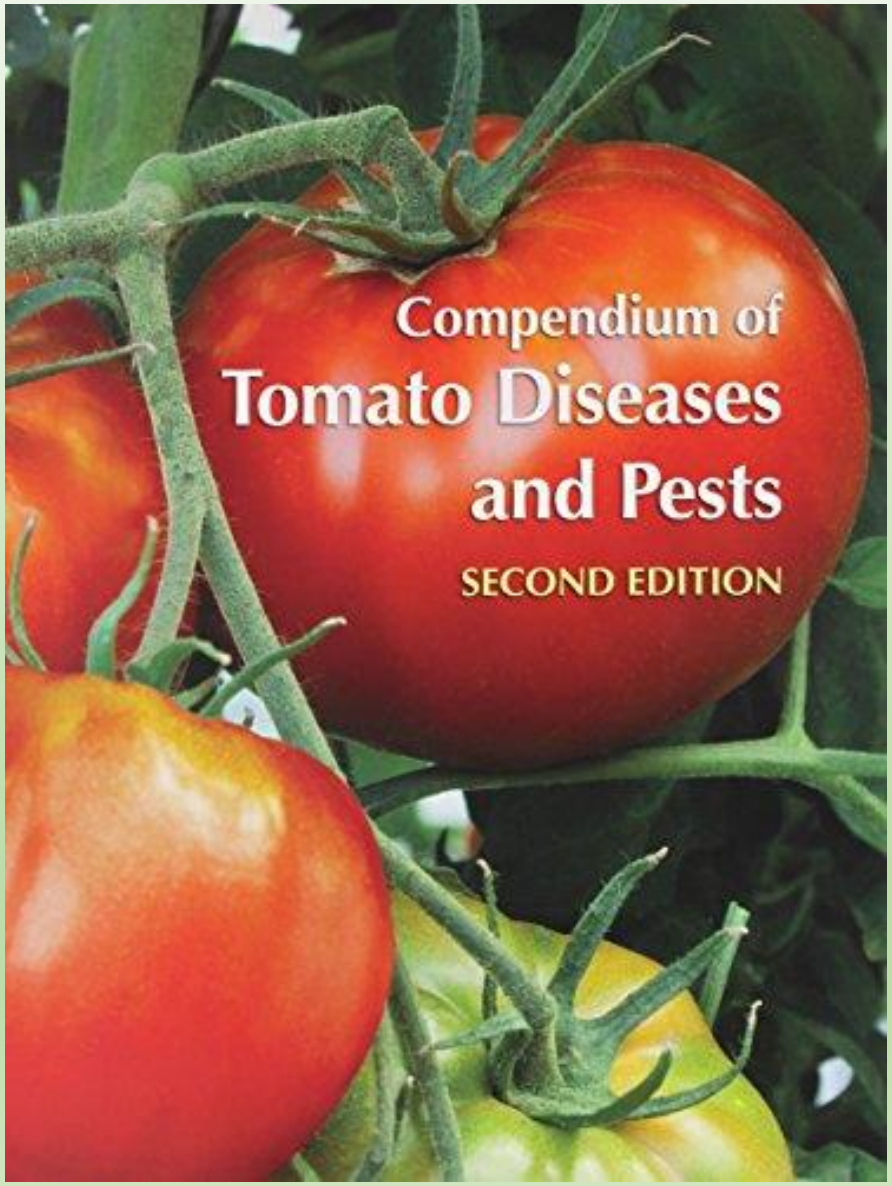


https://homegarden.cahnr.uconn.edu/factsheets/

Books and Print Guides

For growers preferring physical references, these books include scouting sections and are widely respected.

- *Integrated Pest Management for Tomatoes (UC ANR Publication 3274)**
  - **Description**: A comprehensive manual with scouting protocols, pest/disease identification, and IPM strategies. Includes color plates and field checklists.
  - **Access**: Purchase via anrcatalog.ucanr.edu or check libraries.
  - **Region**: Broadly applicable.
- *Compendium of Tomato Diseases and Pests (APS Press)**
  - **Description**: A definitive guide with detailed scouting information, high-quality images, and diagnostic keys for tomato issues. Ideal for in-depth reference.
  - **Access**: Available at apsnet.org or retailers like Amazon.
  - **Region**: Global.



Local and Regional Support

- **County Extension Offices**: Contact your local cooperative extension office for region-specific scouting guides, workshops, or one-on-one consultations. Find offices via nifa.usda.gov/extension.