



Photo Credit: NRCS

## DEFINITION

A site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies.

## PURPOSE

Prevent or mitigate on-site pesticide risks to humans, pollinators and other beneficial species by minimizing the need for pesticide use.

## CONDITIONS WHERE PRACTICE APPLIES

In all high tunnels where plants are grown in natural ground (not containers), and where pests will be managed.

## IPM AND THE PAMS CONCEPT

IPM Prevention, Avoidance, Monitoring, and Suppression (PAMS) techniques include:

*Prevention* – Activities such as cleaning equipment and gear when leaving an infested area, using pest-free seeds and transplants, and irrigation scheduling to limit situations that are conducive to disease development.

*Avoidance* – Activities such as maintaining healthy and diverse plant communities, using pest resistant varieties, crop rotation, and refuge management.

*Monitoring* – Activities such as pest scouting, degree-day modeling, and weather forecasting to help target suppression strategies and avoid routine preventative treatments.

*Suppression* – Activities such as the judicious use of cultural, mechanical, biological and chemical control methods that reduce or eliminate a pest population or its impacts while minimizing risks to non-target organisms.

## OPERATION AND MAINTENANCE

The IPM plan shall include appropriate operation and maintenance items for the client. These may include:

- Review and update the plan periodically in order to incorporate new IPM strategies, respond to cropping system and pest complex changes, and avoid the development of pest resistance.
- Maintain techniques identified in the plan in order to ensure continued effectiveness.
- If applicable, calibrate application equipment according to Extension and/or manufacturer recommendations before each season of use and with each major chemical change.
- Maintain records of pest management activities for at least two years. Pesticide application records shall be in accordance with USDA Agricultural Marketing Service's Pesticide Recording Keeping.

**Record Keeping.** The following records, where applicable, shall be maintained by the producer:

- Monitoring or scouting results including the date, pest population/degree of infestation, and the crop or plant community condition.
- When and where each pest suppression technique was implemented.
- Prevention and Avoidance practices implemented.

**Producer Name:**

**Planner:**

**Date:**

**Location: Tract/Fld**

<b>High Tunnel name/ID</b>			
<b>Area (sq ft)</b>			
<b>Planned Crops Yr 1</b>			
<b>Planned Crops Yr 2</b>			
<b>Planned Crops Yr 3</b>			

<b>Common Pests in High Tunnels:</b>
Fungal – blights, powdery mildew, wilt
Viral
Pests – Slugs, white flies, aphids, mites, hornworms, cucumber beetles, flea beetles

Check all Planned Activities for this IPM Plan:

<b>High Tunnel situation:</b>	
<input type="checkbox"/> East-west orientation	<input type="checkbox"/> Surface runoff diverted away from tunnel if needed
<input type="checkbox"/> Drip irrigation	Soil drainage : <input type="checkbox"/> Good <input type="checkbox"/> Fair
<input type="checkbox"/> Other irrigation type:	<input type="checkbox"/> Soil Fertility is managed in accordance with High Tunnel Soils Test results and recommendations
<input type="checkbox"/> Soil organic matter level maintained at at least 4-5% (per soil test)	OR <input type="checkbox"/> Working to achieve at least 4-5% soil OM

<b>Pre-season:</b>
<input type="checkbox"/> Start with weed-free condition. Action needed to achieve this:
<input type="checkbox"/> Old plant debris removed
<input type="checkbox"/> Sanitized equipment – clips, stakes, irrigation lines, tools
<input type="checkbox"/> Crop rotation planned. Consider temperature needs if planting more than one species per tunnel.
<input type="checkbox"/> Transplants are pest- and disease-free
<input type="checkbox"/> Use disease-resistant cultivars
<input type="checkbox"/> Grafting onto resistant rootstocks
<input type="checkbox"/> Cover crops as biofumigants – brassicas, flax, marigold, forage pearl millet, sorghum-

sudangrass.
<input type="checkbox"/> Transplants from disease-free seed or hot water seed treatment

<b>Crop Production:</b>
<input type="checkbox"/> Disease control – proper ventilation and temperature and humidity regulation – especially monitored early and late in the day. Vegetation immediately adjacent to tunnel kept mown (unless they are short species to attract beneficial insects).
<input type="checkbox"/> Weed control – black plastic mulch, landscape fabric, straw mulch, other
<input type="checkbox"/> Air circulation – plant spacing, trellising, pruning, removal of dead leaves
<input type="checkbox"/> Scout at least weekly for diseases and pests – more frequently during the peak growing season. Recordkeeping of scouting activities is required.

<b>Pest Control:</b>
<input type="checkbox"/> Avoid pesticide use during the middle of the day when pollinator activity is highest
<input type="checkbox"/> Scout and choose areas to “spot treat” to reduce amount and provide refuge to beneficials
<input type="checkbox"/> Recordkeeping of control pesticides and other measures is required.
<i>Select effective least-risk pesticides and application methods when appropriate. Examples include</i>
<input type="checkbox"/> Insecticidal soap <input type="checkbox"/> Bt <input type="checkbox"/> Other
<input type="checkbox"/> Horticultural oils <input type="checkbox"/> Neem
<i>Encourage the presence of beneficial predatory insects by planting flowering plants near or inside the high tunnel—examples:</i>
Dill, Mustard, Thyme, White Clover, Queen Anne’s Lace, Yarrow, Sunflower family (such as Cosmos), Fennel

(Reference: Minnesota High Tunnel Production Manual  
<http://hightunnels.cfans.umn.edu/2010Manual/2010manual.htm>)

**WIN-PST** is utilized by the planner to evaluate the risk of leaching of all pesticides used. The results are attached. If the WIN-PST Interaction Report shows that Leaching Potential and hazard to Humans or Fish is “Intermediate” or higher:

- Choose an alternative pesticide with a lesser risk rating
- OR**
- Develop and implement and Irrigation Water Management Plan

**Recordkeeping is a requirement of this practice.**

**Records must include:**

- **Monitoring/Scouting dates and results**
- **Location and date of pest suppression (Pesticide Application Log or other)**
- **Date of IPM Prevention and Avoidance techniques implemented**

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**SAFETY**

Dispose of herbicide and herbicide containers in accordance with label directions and adhere to federal, state, tribal, and local regulations.

**Northern New England Poison Center**  
**1-800-222-1222**

Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS). MSDS and herbicide labels may be accessed on the Internet at:

<http://www.greenbook.net>

**PRACTICE CHECKOUT:**

**Year 1**

High Tunnel ID	Actual crops grown	Records Checked By	Date

**NOTES:**

**Year 2**

High Tunnel ID	Actual crops grown	Records Checked By	Date

**NOTES:**

**Year 3**

High Tunnel ID	Actual crops grown	Records Checked By	Date

**NOTES:**

