

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PEST MANAGEMENT

(Acre)

CODE 595

DEFINITION

Utilizing environmentally sensitive prevention, avoidance, monitoring and suppression strategies, to manage weeds, insects, diseases, animals and other organisms (including invasive and non-invasive species), that directly or indirectly cause damage or annoyance.

PURPOSES

This practice is applied as part of a Resource Management System (RMS) to support one or more of the following purposes:

- Enhance quantity and quality of commodities.
- Minimize negative impacts of pest control on soil resources, water resources, air resources, plant resources, animal resources and/or humans.

CONDITIONS WHERE PRACTICE APPLIES

Wherever pests will be managed.

CRITERIA

General Criteria Applicable to All Purposes

A pest management component of a conservation plan shall be developed for all operations that manage pests. *All persons who approve pest management components of conservation plans must be certified specialists in pest management, in accordance with Title 180-GM, Part 409, Conservation Planning Policy.*

All methods of pest management must comply with Federal, State, and local regulations, including management plans for invasive pest species, noxious weeds and disease vectors. Compliance with the Food Quality Protection Act (FQPA); Federal Insecticide, Fungicide and Rodenticide Act (FIFRA);

Worker Protection Standard (WPS); Interim Endangered Species Protection Program (H7506C); and the *Massachusetts Pesticide Control Act, as amended (M.G.L. 132B)*, is required for chemical pest control. *State regulations for the labeling, distribution, sale, use and application of pesticides are administered by the Massachusetts Department of Food & Agriculture, under 333 CMR 1.00 – 13.00.*

Integrated Pest Management (IPM) that strives to balance economics, efficacy and environmental risk, where available, shall be incorporated into the pest management component of the conservation plan.

IPM is a sustainable approach to pest control that combines the use of prevention, avoidance, monitoring and suppression strategies, to maintain pest populations below economically damaging levels, to minimize pest resistance, and to minimize harmful effects of pest control on human health and environmental resources. IPM suppression systems include biological controls, cultural controls and the judicious use of chemical controls.

Massachusetts Integrated Pest Management Guidelines are a list of best management practices designed to achieve IPM on specific crops. *Crop Specific Definitions* are available for apple, cole crops, cranberry, field tomato, greenhouse tomato, highbush blueberry, peppers, poinsettia, potato, pumpkin and winter squash, raspberry, strawberry, sweet corn and wine grape. These guidelines function as an educational tool that describes the scope and complexity of IPM. They also document the IPM practices planned and applied and provide a checklist for farmers. The guidelines are maintained by the Massachusetts Department of Food and Agriculture (MDFA). Electronic versions of the guidelines are available at: <http://www.umass.edu/umext/ipm>.

Massachusetts IPM Guidelines work in concert with the NRCS Windows Pesticide Screening Tool (WIN-PST) and Table 1 (attached) to help identify management techniques and conservation practices for achieving an effective level of pest management that is environmentally sound.

An appropriate set of mitigation techniques must be planned and implemented to reduce the environmental risks of pest management activities in accordance with quality criteria in the local Field Office Technical Guide. Mitigation techniques include practices like a Filter Strip or Conservation Crop Rotation, and management techniques like application method or timing

All methods of pest management must be integrated with other components of the conservation plan.

Clients shall be instructed to pay special attention to all environmental hazards and site-specific application criteria listed on pesticide labels and contained in UMass Extension and Crop Consultant recommendations.

Additional Criteria to Protect Quantity and Quality of Commodities

As an essential component of both commodity-specific IPM and IPM general principles, clients shall be encouraged to use the minimum level of pest control necessary to meet their objectives for commodity quantity and quality.

The UMass IPM Program works through six commodity teams to provide research-based outreach education focused on integrated management systems for important service industries and agricultural crops. The commodity teams include: cranberry; floriculture; fruit; turf; vegetable; landscape, nursery and urban forestry. For current IPM articles and reports contact the web pages of the specific teams (<http://www.umass.edu/umext/ipm>).

Additional Criteria to Protect Soil Resources

In conjunction with other conservation practices, the number, sequence and timing of tillage operations shall be managed to maintain soil quality and maintain soil loss at or below the soil loss tolerance (T) or any other planned soil loss objective. (See NRCS Field Office Technical Guide (FOTG), Section I, and Agronomy Handbook Number 703 for approved erosion prediction tools; see also NRCS

National Agronomy Manual, Part 508, Subpart C, Soil Conditioning Index for soil quality rating procedures.)

Clients shall be encouraged to pay special attention to pesticide label instructions for limiting pesticide residues in soil that may negatively impact non-target plants, animals and humans.

Additional Criteria to Protect Water Resources

Pest management environmental risks, including the impacts of pesticides in ground and surface water on humans and non-target plants and animals, must be evaluated for all identified water resource concerns.

NRCS' Windows Pesticide Screening Tool (WIN-PST) shall be used to evaluate soil/pesticide interactions and associated environmental risks.

When a chosen alternative has significant potential to negatively impact important water resources, (e.g., WIN-PST "Extra High", "High" or "Intermediate" soil/pesticide human risk ratings in the drainage area of a drinking water reservoir), an appropriate set of mitigation techniques must be put in place to address risks to humans and non-target plants and animals. Selection of mitigating practices and/or management techniques shall be based on site-specific resource concerns and pesticide loss pathways (see Table 1).

Clients shall be encouraged to pay special attention to pesticide label instructions for limiting pesticide residues in leachate and runoff that may negatively impact non-target plants, animals and humans.

The number, sequence and timing of tillage operations shall be managed in conjunction with other sediment control tactics and practices, in order to minimize sediment losses to nearby surface water bodies.

Restricted-use pesticide products are listed by the state as *Potential Groundwater Contaminants*. A pesticide that contains an active ingredient on the state list may be applied within the primary recharge area of a public drinking water supply well, under the following conditions:

1. For a pesticide product that is applied to an area which has **greater** than 50% foliar cover, the applicator must ensure that:
 - there is no viable alternative to the use of the pesticide, and

- the pesticide is being applied as part of a Department approved Integrated Pest Management (IPM) program.
2. For a pesticide product that is soil applied or applied to an area with less than 50% ground cover the applicator must ensure that:

- there is no viable alternative to the use of the pesticide, and
- the pesticide is being applied as part of a Department approved Integrated Pest Management (IPM), and
- a Pesticide Management Plan (PMP) for that use pattern has been approved by the Department of Food and Agriculture.

Massachusetts Groundwater Protection List and Wellhead Protection List are available online at: <http://www.state.ma.us/dfa/pesticides/water/index.htm>

Current maps of Massachusetts Water Supply Protection Areas are available online at <http://www.state.ma.us/mgis/mapping.htm>.

Additional Criteria to Protect Air Resources

Clients shall be encouraged to pay special attention to pesticide label instructions for minimizing volatilization and drift that may negatively impact non-target plants, animals and humans.

Additional Criteria to Protect Plant Resources

Clients shall be encouraged to pay special attention to pesticide label instructions including those directed at:

- Preventing misdirected pest management control measures that negatively impact plants (e.g., removing pesticide residues from sprayers before moving to the next crop and properly adjusting cultivator teeth and flame burners).
- Appropriate climatic conditions, crop stage, soil moisture, pH, and organic matter in order to protect plant health.
- Limiting pesticide residues in soil that can carry over and harm subsequent crops.

Additional Criteria to Protect Animal Resources

Clients shall be encouraged to pay special attention to pesticide label instructions that minimize negative impacts to animals.

Additional Criteria to Protect Humans

Clients shall be encouraged to take the following actions in protecting humans from harmful effects of pesticides:

- Pay special attention to pesticide label instructions that minimize negative impacts to humans.
- Develop an emergency response plan that lists actions to take and personnel to contact in the event of a spill or accident.
- Post materials safety data sheets for each pesticide in a prominent location. At a minimum, employers should post the product label and physical and health hazards associated with the pesticides being used.
- Place personal protection equipment and first-aid kits immediately outside pesticide storage areas.

Pest management activities on school property must comply with all pertinent laws and regulations (see "An Act Protecting Children and Families from Harmful Pesticides", amendment to the Massachusetts Pesticide Control Act.) For specific guidelines, contact the Massachusetts Pesticide Bureau.

CONSIDERATIONS

If commodity-specific IPM is not available, the following IPM principles should be considered:

- Prevention, such as using pest-free seeds and transplants, cleaning tillage and harvesting equipment between fields, irrigation scheduling to avoid situations conducive to disease development, etc.
- Avoidance, such as using pest resistant varieties, crop rotation, trap crops, etc.
- Monitoring, such as pest scouting, soil testing, weather forecasting, etc. to help target suppression strategies and avoid routine preventative pest control.
- Suppression, such as cultural, biological and chemical controls, that can reduce a pest

population or its impacts. Chemical controls should be used judiciously in order to minimize environmental risk and pest resistance.

Adequate plant nutrients and soil moisture, including favorable pH and soil conditions, should be available to reduce plant stress, improve plant vigor and increase the plant's overall ability to tolerate pests.

On irrigated land, irrigation water management should be designed to minimize pest management environmental risk.

PLANS AND SPECIFICATIONS

The pest management component of a conservation plan shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s). Specifications for applying this practice shall be prepared for each site and recorded and filed using approved job specification sheets and narrative statements in the conservation plan (MA-CPA-595).

As a minimum, the pest management component of a conservation plan shall include:

- Plan map and soil map of managed site, if applicable (use RMS plan maps if available).
- Location of sensitive resources and setbacks, if applicable (use RMS plan maps if available).
- Environmental risk analysis for sensitive areas with WIN-PST Soil/Pesticide Interaction Hazard Ratings, for probable pest management recommendations by crop (if applicable) and pest. The assessment will include Interaction Leaching Potential (ILP), Interaction Solution Runoff Potential (ISRP), and Interaction Absorbed Runoff Potential (IARP) Human and Fish Hazard Ratings.
- Interpretation of the environmental risk analysis and identification of appropriate mitigation techniques.
 - Hazard Ratings of 'Low' or 'Very Low' require no mitigation.
 - Hazard Ratings of 'Intermediate' or 'High' require mitigation techniques to meet quality criteria for an RMS. 'High' ratings warrant more extensive mitigation techniques than 'Intermediate' ratings. (See Table 1)

- Mitigation techniques may not be adequate for 'Extra High' hazard ratings if resources are highly sensitive or a high degree of resource protection is desired. In these cases, an efficacious, economically acceptable alternative pesticide with a lower risk or an alternate method of pest control will be required to meet RMS quality criteria.

- Operation and maintenance requirements.

Pesticide selection shall be based on suitability to control target pests, environmental impacts, and costs.

All pesticides used must be registered at the time of use with the Massachusetts Department of Food & Agriculture. For information contact the Pesticide Bureau at 251 Causeway Street, Boston, MA 02114. (617) 626-1778.

OPERATION AND MAINTENANCE

The pest management component of a conservation plan shall include appropriate operation and maintenance items for the client. These shall include:

- Review and update the plan periodically in order to incorporate new IPM technology, respond to cropping system and pest complex changes, and avoid the development of pest resistance.
- Maintain mitigation techniques identified in the plan in order to ensure continued effectiveness.
- Develop a safety plan for individuals exposed to chemicals, including the posting of materials safety data sheets, availability of personal protection equipment, and telephone numbers and addresses of emergency treatment centers for individuals exposed to chemicals and the telephone number for the nearest poison control center.
 - Mass. Poison Control System
300 Longwood Ave.
Boston, MA 02115
1-617-232-2120
1-800-682-9211 (in MA only)
 - EPA Emergency Pesticide Poisoning Response Center:
1-800-424-8802

- The National Pesticide Information Center (NPIC)
Corvallis, Oregon
(For non-emergency information)
1-800-858-7378
Monday - Friday
6:30 a.m. to 4:30 p.m. Pacific Time
- Clients should be encouraged to develop a spill response kit containing materials and guidance for actions to take and personnel to contact in the event of a spill or accident. In the event of a significant spill, clients should be advised to contact the fire department. For smaller spills that do not present immediate hazards, clients should be advised to remain calm, control the spill, contain the spill, and clean up the spill.
- For advice and assistance with emergency spills that involve agrichemicals, the local emergency telephone number shall be provided.
 - Massachusetts Department of Environmental Protection, Emergency Response Hotline (617) 556-1133
 - EPA Emergency Treatment (*spills*) (617) 223-7265
 - CHEMTREC National Pesticide Emergency Network (24-hour) 1-800-424-9300
- Advise clients that spills and adverse effects (i.e. worker illness, fish kill) must be reported within 24 hours to the Massachusetts Pesticide Bureau at (617) 626-1782.
- All discharges to the environment or spills should be recorded. The records should include the date and time of the incident and the cleanup.
- Follow label requirements for mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, or reservoirs.
- Post signs according to label directions and/or Federal and State laws around sites that have been treated. Follow restricted entry intervals.
- Dispose of pesticides and pesticide containers in accordance with label directions and adhere to Federal and State regulations. All waste pesticide material should be disposed of as a hazardous waste facility. Contact the Pesticide Bureau's Pesticide Collection Program for storage and disposal information.
- Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS).
- Calibrate application equipment according to Extension and/or manufacturer recommendations before each seasonal use and with each major chemical change.
- Replace worn nozzle tips, cracked hoses, and faulty gauges.
- Maintain records of pest management for at least two years. Pesticide application records shall be in accordance with USDA Agricultural Marketing Service's Pesticide Record Keeping Program and state specific requirements.
 - ❑ Massachusetts state regulations mandate the completion of annual reports detailing the quantities of all pesticides used by licensed pesticide applicators (see <http://www.state.ma.us/dfa/pesticides/usereports/index.htm>)
 - ❑ USDA's Agricultural Marketing Service, Federal Pesticide Record-keeping Program requires all certified private applicators to keep records of their use of federally restricted use pesticides. (For details, see: <http://www.ams.usda.gov/science/sdpr.htm>)
 - ❑ EPA's current Restricted Use Products (RUP) Report is available online at: www.epa.gov/RestProd/.
 - ❑ Massachusetts Restricted-Use Pesticides are available online at <http://www.state.ma.us/dfa/pesticides/registration/>
 - ❑ The Federal Pesticide Recordkeeping regulations require the certified private pesticide applicator to record the following for each application, within 14 days of the application:
 - ❑ Trademark name of pesticide used;
 - ❑ EPA Registration Number;
 - ❑ Total quantity of the pesticide applied, reported in common units;

- The date of the application (month, day and year);
 - The location of the application (i.e. plat IDs used by FSA or NRCS; legal property description);
 - Crop commodity, stored product, or site being treated
 - Size of area treated;
 - Name and certification number of the private applicator performing and/or supervising the application.
- Spot treatments of <1/10 total area require the following records:
- Date of the application
 - Branch or product number
 - EPA registration number
 - Total amount of pesticide applied
 - Location of the pesticide application
- The federal pesticide recordkeeping regulations require all commercial applicators to furnish a copy of the data elements required by this regulation to the customer within 30 days of the restricted used pesticide application.
- For more information, contact the: USDA Pesticide Records Branch 8700 Centreville Road, Suite 202 Manassas, VA 20110 Phone (703) 333-7826

REFERENCES

- Adams, Rober G., and Jennifer c. Clark (Eds.). 1995. *Northeast sweet Corn Production and integrated Pest Management Manual*. University of Connecticut Cooperative Extension System: Storrs.
- Hollingsworth, Craig S., and William M. Coli (Eds). 1999. *Massachusetts Integrated Pest Management Guidelines: Crop Specific Definitions*. UMass Extension: Amherst.
- IPM Field Corn Pocket Guide: Northeast Region*. NY State IPM Program. Cornell University: Ithaca.
- Massachusetts Pesticide Bureau. *Storage, Mixing and Loading of Pesticides*. MDFA: Boston.
- New England Vegetable Management Guide. 2000-2001*. New England Extension System. University of Massachusetts: Amherst.

Owen, Mary and Michael Tiskus (Eds). 2000 update. *Professional Guide for IPM in Turf for Massachusetts*. UMass Extension: Amherst.

Schloemann, Sonia, (Ed.). *2000-2002 New England Small Fruit Pest Management Guide: Managing Diseases, Insects and Weeds on Small Fruits*. Cooperative Extension System. UMass: Amherst.

Uva, Richard H., Joseph C. Neal and Joseph M. DiTomaso. 1997. *Weeds of the Northeast*. Comstock Publishing Associates: Ithaca.

2000 Cranberry Chart Book – Management Guide for Massachusetts. UMass Extension: West Wareham.

2002 Cornell Guide for Integrated Field Crop Management. Cornell Cooperative Extension: Ithaca.

Web Links:

Massachusetts Pesticide Bureau:
<http://www.state.ma.us/dfa/pesticides>

NRCS National Water and Climate Center – Pest Management Homepage
<http://www.wcc.nrcs.usda.gov/water/quality/frame/pestmgt.html>

- Windows Pesticide Screening Tool
<http://www.wcc.nrcs.usda.gov/water/quality/common/pestmgt/winpst.htm>

UMass Integrated Pest Management Program
<http://www.umass.edu/umext/ipm/>

- [Cranberry Experiment Station.](http://www.umass.edu/umext/ipm/ipm_projects/cranberry.html)
http://www.umass.edu/umext/ipm/ipm_projects/cranberry.html
- [Floriculture Team.](http://www.umass.edu/umext/programs/agro/floriculture)
<http://www.umass.edu/umext/programs/agro/floriculture>
- [Fruit Team.](http://www.umass.edu/fruitadvisor/)
<http://www.umass.edu/fruitadvisor/>
- Agroecology Turf Team.
<http://www.umasssturf.org>
- Vegetable Team.
<http://www.umassvegetable.org>

- Landscape, Nursery and Urban Forestry.
www.umassgreeninfo.org

USDA Regional Pest Management Centers
www.pmcenters.org

U.S. EPA Office of Pesticide Programs
www.epa.gov/pesticides

U.S. EPA Pesticide Product Information Query Site:
Product information and label images.
<http://www.cdpr.ca.gov/docs/epa/epamenu.htm>

**TABLE I – Mitigation Effectiveness Guide:
Reducing Pesticide Impacts on Water Quality**

Note: Pest Management (595) requires environmental risk evaluation and appropriate mitigation for all identified resource concerns. This table identifies management techniques and conservation practices that have the potential to mitigate pesticide impacts on water quality. Not all techniques will be applicable to a given situation. Relative effectiveness ratings by pesticide loss pathway are “no effect” (blank), “slight effect” (+/-), “moderate effect” (++/--), and “significant effect” (+++/---). The table also identifies how the techniques function. Effectiveness of any mitigation technique can be highly variable based on site conditions and how it is designed. Therefore, with guidance provided by the table, site-specific selection and design of mitigation techniques that are appropriate for identified resource concerns is left to the professional judgement of the conservation planner.

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Management Techniques ^{1/}				
Application Timing	+++	+++	+++	Reduces exposure potential - delaying application when significant rainfall events are forecast can reduce pesticide transport to ground and surface water, application when conditions are optimal can reduce the amount of pesticide applied, also delaying application when wind speed is not in accordance with label requirements can reduce pesticide drift to surface water
Formulations/Adjuvants	++	++	+	Reduces exposure potential - formulations and/or adjuvants that increase efficacy allow lower application rates
Lower Application Rates	+++	+++	+++	Reduces exposure potential - use lowest effective rate
Substitution	+++	+++	+++	Reduces hazard potential - use alternative pesticides with lower environmental risk, cultural practices (including burning and mechanical controls) and biological controls can reduce the need for pesticides
Partial Treatment	+++	+++	+++	Reduces exposure potential - spot treatment, banding and directed spraying reduce amount of pesticide applied
Pesticide Label Environmental Hazard Warnings and BMPs	Required _{2/}	Required _{2/}	Required _{2/}	Reduces exposure potential - label guidance must be carefully followed for pesticide applications near water bodies and on soils that are intrinsically vulnerable to erosion, runoff, or leaching
Scouting and Integrated Pest Management (IPM) Thresholds	+++	+++	+++	Reduces exposure potential - reduces the amount of pesticide applied
Set-backs	+	++	+	Reduces exposure potential - reduced application area reduces amount of pesticide applied, also reduces inadvertent pesticide application and drift to surface water
Soil Incorporation - mechanical or irrigation	---	+++	+++	Reduces exposure potential for surface losses, but increases exposure potential for leaching losses

TABLE I - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Conservation Practices ^{3/}				
Agrichemical Mixing Facility (702)	+++	+++	+++	Reduces the potential for point source pesticide contamination
Brush Management (314)	+++	+++	+++	Using non-chemical brush control often reduces the need for pesticides, pesticide use requires environmental risk analysis and appropriate mitigation - see Pest Management (595)
Conservation Cover (327)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Conservation Crop Rotation (328)	++	++	++	Reduces the need for pesticides by breaking pest lifecycles
Constructed Wetland (656)	+	+	++	Captures pesticide residues and facilitates their degradation
Contour Buffer Strips (332)		++	++	Increases infiltration, reduces soil erosion
Contour Farming (330)	-	+	+	Increases infiltration, reduces soil erosion
Contour Stripcropping (585)		++	++	Increases infiltration, reduces soil erosion
Cover Crop (340)	+	+	++	Increases infiltration, reduces soil erosion, builds soil organic matter
Cross Wind Ridges (589A)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Cross Wind Stripcropping (589B)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Cross Wind Trap Strips (589C)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Deep Tillage (324)	-	+	+	Increases infiltration
Dike (356)	++/--	++	++	Reduces exposure potential - excludes outside water (++) leaching) or captures pesticide residues and facilitates their degradation (-- leaching)
Diversion (362)	+	+	+	Reduces exposure potential - water is diverted
Field Border (386)		+	++	Increases infiltration and traps adsorbed pesticides, often reduces application area resulting in less pesticide applied, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also reduces inadvertent pesticide application and drift to surface water
Filter Strip (393)		++	+++	Increases infiltration and traps adsorbed pesticides, often reduces application area resulting in less pesticide applied, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also reduces inadvertent pesticide application and drift to surface water
Forage Harvest Management (511)	++	++	++	Reduces exposure potential - timely harvesting reduces the need for pesticides

TABLE I - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Forest Stand Improvement (666)	++	++	++	Reduces the potential for pest damage and the need for pesticides
Grade Stabilization Structure (410)			++	Traps adsorbed pesticides
Grassed Waterway (412)		+	++	Increases infiltration and traps adsorbed pesticides (should be applied with Filter Strips at the outlet and on each side of the waterway)
Hedgerow Planting (442)			(+) 4/	Reduces adsorbed pesticide deposition in surface water, also reduces inadvertent pesticide application and drift to surface water
Herbaceous Wind Barriers (603)			(+) 4/	Reduces wind erosion, traps adsorbed pesticides, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also reduces pesticide drift to surface water
Irrigation System, Microirrigation (441)	++	+++	+++	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System, Sprinkler (442)	++	++	++	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System Tail Water Recovery (447)		+++	+++	Captures pesticide residues and facilitates their degradation
Irrigation Water Management (449)	+++	+++	+++	Reduces exposure potential - water is applied at rates that minimize pesticide transport to ground and surface water, promotes healthy plants which can better tolerate pests
Land Smoothing (466)	+	+	+	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Mulching (484)	+	+/-	+/-	Often reduces the need for pesticides, natural mulches increase infiltration and reduce soil erosion (+ runoff), artificial mulches may increase runoff and erosion (- runoff)
Nutrient Management (590)	++	++	++	Promotes healthy plants which can better tolerate pests
Pasture and Hay Planting (512)	++	++	++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Prescribed Burning (338)	++	++	++	Often reduces the need for pesticides
Prescribed Grazing (528A)	++	++	++	Improves plant health and reduces the need for pesticides
Recreation Area Improvement (562)	++	++	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, builds soil organic matter
Residue Management, No-till and Strip-Till (329A)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Mulch-Till (329B)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter

TABLE I - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Residue Management, Ridge Till (329C)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Seasonal (344)	+	+	+	Increases infiltration, reduces soil erosion, builds soil organic matter
Riparian Forest Buffer (391)	+	+++	+++	Increases infiltration and uptake of subsurface water, traps sediment, builds soil organic matter
Riparian Herbaceous Cover (390)	+	++	++	Increases infiltration, traps sediment, builds soil organic matter
Sediment Basin (350)			++	Captures pesticide residues and facilitates their degradation
Stripcropping, Field (586)		+	+	Increases infiltration, reduces soil erosion
Structure For Water Control (587)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration
Subsurface Drain (606)	+	++	++	Increases surface infiltration and aerobic pesticide degradation in the rootzone *Note - avoid direct outlets to surface water
Surface Drainage, Field Ditch (607)	+	+	+	Increases surface infiltration and aerobic pesticide degradation in the rootzone
Surface Roughening (609)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Terrace (600)	--	++	+++	Increases infiltration, reduces soil erosion
Tree and Shrub Establishment (612)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, increases infiltration and uptake of subsurface water, builds soil organic matter
Vegetative Barriers (601)			++	Reduces soil erosion, traps sediment, increases infiltration
Waste Storage Facility (313)	+	++	++	Captures pesticide residues
Waste Treatment Lagoon (359)		+++	+++	Captures pesticide residues and facilitates their degradation
Waste Utilization (633)	++	++	++	Increases soil organic matter
Water and Sediment Control Basin (638)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration
Wetland Creation (Ac.) (658)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Enhancement (Ac.) (659)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Restoration (Ac.) (657)	+	+	+	Captures pesticide residues and facilitates their degradation
Windbreak/Shelterbelt Establishment (380)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also reduces pesticide drift
Windbreak/Shelterbelt Renovation (650)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also reduces pesticide drift

TABLE I - (continued)

FOOTNOTES

^{1/} Additional information on pest management mitigation techniques can be obtained from Extension pest management publications, pest management consultants and pesticide labels.

^{2/} The pesticide label is the law - all pesticide label specifications must be carefully followed, including required mitigation. Additional mitigation may be needed to meet NRCS pest management requirements for identified resource concerns.

^{3/} Details regarding the effects of Conservation Practices on ground and surface water contamination by pesticides are contained in the Conservation Practice Physical Effects matrix found in the National Handbook of Conservation Practices.

^{4/} Mitigation applies to adsorbed pesticide losses being carried to surface water by wind.