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.

PURPOSE

Enhance the quantity and quality of commodities, while minimizing the negative impacts of pest control on humans and soil, water, air, plant, and animal resources.

CONDITIONS WHERE PRACTICE APPLIES

Wherever pests will be managed.

CRITERIA

General Criteria

This practice is accomplished through the development and implementation of a Pest Management Plan. All methods of pest management included in the pest management plan must be compatible with other components of the overall conservation plan.

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); and Interim Endangered Species Protection Program (H7506C) is required for chemical pest control. NRCS does not develop pesticide recommendations or change label instructions or recommended specifications for pesticide application.

Integrated Pest Management (IPM) that strives to balance economics, efficacy and environmental risk shall be incorporated into planning alternatives. (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.)
Information on IPM is found at http://ipm.ncsu.edu . This site is organized by crops. Most crops and pests found in North Carolina are addressed. Links are provided to seek information for crops and pests not yet posted. At a minimum, the IPM principles included in the Considerations section of this standard must be considered.

Plans will notify clients to pay special attention to all environmental hazards and site-specific application criteria listed on pesticide labels and contained in Extension and Crop Consultant recommendations.

Pest management planning shall locate sensitive resources for exclusion of pest management activities when resource degradation is likely.

Criteria to Protect Quantity and Quality of Commodities

As an essential component of IPM, clients shall be encouraged to use the minimum level of pesticides necessary to meet their

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. Soil loss shall be determined by using the current version of the Revised Universal Soil Loss Equation (RUSLE) being used by the Natural Resources Conservation Service in North Carolina. The Soil Conditioning Index (SCI), found in the FOTG III, may also be used to assess the effects of management practices

on soil quality.

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.

Criteria to Protect Water Resources

Environmental risks associated with pest management, including the impacts of pesticides in ground and surface water on humans and non-target plants and animals, must be evaluated for all water resource concerns. Pest management planning shall include an analysis of the potential for pesticide runoff and leaching when pesticides are a component of the pest management strategy, by using the Natural Resources Conservation Service's Windows Pesticide Screening Tool (WIN-PST) in North Carolina.

The WIN-PST program can be obtained at www.wcc.nrcs.usda.gov/water/quality/common/pestmgt/winpst.htm.

WIN-PST shall be used to assess all pesticides specified for planned use by the client, or recommendations the client has received from consultants or the Cooperative Extension Service. When specific recommendations from these sources are not available, WIN-PST may be used with commonly used chemicals for the crop/pest, as found in the current N.C. Agricultural Chemicals Manual.

Based on research in North Carolina, WIN-PST may overestimate the influence of a high water table or pesticide movement. While selecting soils for evaluation in WIN-PST, planners may deactivate the "High Water Table" selection in the "Site Conditions" category when in the "Select Soils" screen. Deactivating the high water table is appropriate when any of the following applies:

1. When organic matter content of the surface layer is 3% or greater.
2. When the site has been drained.
3. When the soil represents an inclusion which is well drained.
4. When the pesticide in question is applied during the season when the water table is not high enough to restrict crop growth.
5. Other documented reasons that eliminate a high water table from being a high potential loss pathway.

When a chosen alternative has significant potential to negatively impact water resources of concern (WIN-PST "Extra High", "High" or "Intermediate" soil/pesticide ratings), an appropriate set of mitigation techniques must be planned and applied.

To reduce the potential impacts on surface or ground water, select appropriate mitigating practices from Table 1*, "Mitigation Effectiveness Guide – Reducing Pesticide Impacts on Water Quality"*. General guidance for interpreting the WIN-PST Hazard Ratings is as follows:

WIN-PST Hazard Category	Guidance
Extra High	Mitigation may not work without changing the selected pesticide.
High	A combination of three or more mitigating actions may be required.
Intermediate	One or two mitigating practices may be required.
Low and Very Low	Additional mitigating practices may not be required, except of a preventive nature.

The interpretations above should only be used as a general guide; site-specific factors will always influence the complexity of the mitigation strategy.

The results of WIN-PST, along with potential mitigating practices to reduce the likelihood of runoff or leaching, shall be discussed with the client as part of the planning process.

Criteria to Protect Air Resources

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

Criteria to Protect Plant Resources

Clients shall pay special attention to weed control and pesticide label instructions including those directed at::

- Preventing misdirected pest management control measures that negatively impact non target plants (e.g., removing pesticide

residues from moving to the next crop, avoiding drift or volatilization 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 and improve efficacy.
- Restrictions regarding pesticide ingredients that can persist (carry over) and remain active in the soil and harm subsequent crops.

Criteria to Protect Animal Resources

Clients shall pay special attention to pesticide label instructions that minimize negative impacts to animals. All classes of wildlife, pets, and grazing animals should be considered.

Criteria to Protect Humans

Clients shall pay special attention to pesticide label instructions that minimize negative impacts to humans, such as minimum waiting periods before reentry into pesticide treated areas, or minimum clothing required by workers applying a pesticide.

CONSIDERATIONS

Consider the following IPM principles (at a minimum) when a commodity-specific IPM strategy is not available:

- All planned pest control should consider the entire ecosystem to ensure checks and balances between crop plants, pests, beneficial organisms and the physical environment are not interrupted. The following should be considered:
  - ♦ Over reliance on one pest control method can lead to pest resistance, resurgence, and replacement.
  - ♦ Tolerate a pest until it's economic threshold has been passed.
  - ♦ Understand the pest's biology and ecology so that causes of the outbreak, not the symptoms can be addressed.
  - ♦ Over zealous pest management can severely reduce the effectiveness of natural controls whereby you inherit their role.
- Prevention strategies, 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 strategies, 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.

Consider that 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.

Consider there are areas not suitable for cultivation of weeds because of erosion hazard, or not suitable for pesticide application because of drift, runoff or leaching, or not suitable for burning because of wildfire hazard, or not suitable for biological control because of the presence of non-target vulnerable species.

Consider that on irrigated land, irrigation water management should be designed to minimize pest management environmental risk.

Consider that herbicides are most effective when applied to weeds that are not stressed by drought. To hasten their utilization and minimize potential for loss and perhaps re-application, apply to plants free from drought stress.

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 the intended purpose.

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

- Plan map and soil map of managed site, showing fields planned
- Location of sensitive resources and setbacks
- Appropriate integrated pest management (IPM) actions or strategies

- WIN-PST environmental risk analysis for pest management recommendations when pesticides are part of the pest control strategy
- Interpretation of the environmental risk analysis and identification of appropriate mitigation techniques
- Operation and maintenance requirements

OPERATION AND MAINTENANCE

Operation and Maintenance consists of repetitive actions necessary to insure that the practice performs adequately throughout its life expectancy.

As part of the Operation and Maintenance guidance, the client shall be instructed to:

- Review and update the plan periodically in order to incorporate new IPM technology, respond to changes in the cropping system and targeted pests, and avoid the development of pest resistance.
- Inspect and maintain mitigation techniques identified in the plan in order to ensure continued effectiveness.
- Develop and review a safety plan including telephone numbers and addresses of emergency treatment centers and the telephone number for the nearest poison control center. (The most recent emergency contact information is available on the inside cover of the North Carolina Agricultural Chemicals Manual.) The safety plan should include a routine inspection of all safety equipment and a review of safety procedures.
- Read and follow all requirements in local, state, and federal rules and regulations.
- www.msdssearch.com or www.msdsonline.com .
- Ensure worker safety requirements specified on pesticide labels, rules, and that regulations are obeyed.

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

Note: 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
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
Soil Incorporation – mechanical or irrigation	---	+++	+++	Reduces exposure potential for surface losses, but increases exposure potential for leaching losses
Substitution – ▪ Alternative pesticides ▪ Cultural controls ▪ Biological controls	+++	+++	+++	Reduces hazard potential - use alternative pesticides with low environmental risk, substituting cultural (including burning and mechanical controls) and biological controls can reduce the need for pesticides

TABLE 1 Continued

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Conservation Practices [3/]				
Agrochemical Mixing Facility (Interim)	+++	+++	+++	Reduces the potential for point source pesticide contamination
Alley Cropping (311)	+	+	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, can provide habitat for beneficial insects which can reduce the need for pesticides, also can reduce pesticide drift to surface water
Bedding (310)	+	+	+	Increases surface infiltration and aerobic pesticide degradation in the rootzone
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 Mgt. (595)
Conservation Cover (327)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides; builds soil organic matter
Constructed Wetland (656)	+	+	++	Captures pesticide residues and facilitates their degradation
Conservation Crop Rotation (328)	++	++	++	Reduces the need for pesticides by breaking pest lifecycles
Contour Farming (330)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Contour Orchard and Other Fruit Area (Ac.) (331)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Cover Crop (340)	+	+	++	Increases infiltration, reduces soil erosion, builds soil organic matter
Cross Wind Stripcropping (589B)			(++) [4/]	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Deep Tillage (324)	-	+	+	Increases infiltration and deep percolation
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

TABLE 1 Continued

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
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 can reduce 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 can reduce inadvertent pesticide application and drift to surface water
Forage Harvest Management (511)	++	++	++	Reduces exposure potential – timely harvesting reduces the need for pesticides
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 & traps adsorbed pesticides (should be applied w/ Filter Strips at the outlet and on each side of the waterway)
Grazing Land Mechanical Treatment (548)	-	+	+	Increases infiltration and deep percolation
Hedgerow Planting (442)			(+) 4/	Reduces adsorbed pesticide deposition in surface water, also can reduce 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 can reduce pesticide drift to surface water

TABLE 1 Continued

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Irrigation Land Leveling (464)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and 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, Surface and Subsurface (443)	+	+	+	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
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
Mole Drain (482)	+	+	+	Increases infiltration and aerobic pesticide degradation in the rootzone *Note – avoid direct outlets to surface water
Mulching (484)	+	+/-	+/-	Often reduces the need for pesticides, natural mulches increase infiltration and reduce soil erosion (+ solution and adsorbed runoff), artificial mulches may increase runoff and erosion (- solution and adsorbed 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
Precision Land Forming (462)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Prescribed Burning (338)	++	++	++	Often reduces the need for pesticides
Prescribed Grazing (528A)	++	++	++	Improves plant health and reduces the need for pesticides

TABLE 1 Continued

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
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, 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
Row Arrangement (557)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Sediment Basin (350)			++	Captures pesticide residues and facilitates their degradation
Stripcropping (585)		+ ++	+ ++	Increases infiltration, reduces soil erosion Row grade > .6% Row grade <= .6%
Structure For Water Control (587)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration and deep percolation
Subsurface Drainage (606)	+	++	++	Increases infiltration and aerobic pesticide degradation in the rootzone *Note – avoid direct outlets to surface water
Surface Drainage, Field Ditch (607)	+	+	+	Increases infiltration and aerobic pesticide degradation in the rootzone
Terrace (600)	--	++	+++	Increases infiltration and deep percolation, 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
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 and deep percolation

TABLE 1 - Continued

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Water Table Control (641)	++/--	++	++	Seasonal saturation may reduce the need for pesticides, drainage reduces stormwater runoff, drainage increases infiltration and aerobic pesticide degradation in the rootzone during the growing season (++ leaching), seasonal saturation may bring the water table in contact with pesticide residues from the previous growing season (-- leaching)
Well Decommissioning (351)	+++			Eliminates point source contamination
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, reduces adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also can reduce pesticide drift

[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.