

**Background/Instructions**

The following guide identifies mitigation measures and conservation practices and rates their relative effectiveness to mitigate pesticide loss by pesticide loss pathway. Site-specific selection of appropriate pesticide management techniques and conservation practices needed to address identified resource concerns shall be left to the professional judgement of the planner and conservation objectives of the producer. Effects will vary due to practice design and site conditions and may need to be adjusted appropriately. Refer to Section V of the Field Office Technical Guide to determine water quality impacts (Conservation Practice Effects) for conservation practices that are not listed in Appendix A. Relative effects on reducing pesticide loss are listed for a given pesticide loss pathway:

**Relative Effect on Pesticide Loss**

- (+++) = Significant Positive Effect on Pesticide Loss (stand alone measures)
- (++) = Moderate Positive Effect on Pesticide Loss
- (+) = Slight Positive Effect on Pesticide Loss
- (-) = Slight Negative Effect on Pesticide Loss
- N/A = Generally No Appreciable Effect on Pesticide Loss
- Multiple listing = Different impacts on pesticide loss depending on practice design and site conditions

**Pesticide Loss Pathways:**

- Wind Erosion = Pesticides are adsorbed to sediment transported by wind erosion processes (saltation, creep and suspension)
- Leaching = Pesticides move in solution through soil profile.
- Solution Runoff = Pesticides transported in runoff water in solution.
- Adsorbed to Sediment = Pesticides adsorbed to sediment in runoff water.
- Concentrated Solution Runoff = Pesticide transported in runoff water in solution in concentrated channels/ditches, etc.
- Concentrated Runoff Adsorbed = Pesticides adsorbed to sediment in runoff water transported in concentrated channels/ditches, etc.

<sup>1 2</sup>Pesticide Management Measures/Relative Effectiveness to Mitigate Pesticide Loss by Pesticide Loss Pathway

Pesticide Mgt Techniques	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff adsorbed	Description/requirements
Application Timing	N/A	++	++	++	N/A	N/A	Delay application when significant rainfall events are forecast can reduce pesticide transport to ground and surface water, application when conditions are optimal can also reduce the amount of pesticide needed. Delaying application until wind speed is below minimum label requirements can reduce pesticide drift to surface water on sites adjacent to streams or other water bodies.
Band or Spot Application	N/A	++	++	++	N/A	N/A	Spot application, banding or directed spray according to pesticide label to decrease pesticide exposure and environmental risk.
Lower Application Rates (broadcast applications only)	N/A	++	++	++	N/A	N/A	Reduce application rates by at least 25% below labeled rates (use lowest effective rate) through use of formulations/adjuvants, optimum timing of treatment, or by tank mixes with lower risk pesticides, cultural, or biological controls. Efficacy can be maintained by use of formulations/adjuvants, allowing for lower rates or by spraying weeds at the optimum time or by substituting cultural (i.e. burning and mechanical controls) and biological controls can allow for reduced rates. Reduces exposure potential use applicable formulations and/or adjuvants to increase efficacy and decrease application rates according to pesticide labels or use the lowest effective application rate on pesticide labels to decrease environmental risk.
Pesticide Label Precautionary Statements	N/A	++	++	++	N/A	N/A	Abide by precautionary statements on recommendations to minimize environmental hazards that are included on pesticide labels that will decrease loss potential in the applicable pesticide loss pathway (beyond minimum label requirements). All pesticide label requirements must be carefully followed.

<sup>1</sup> All Pesticide applications are based on economic thresholds and field scouting prior to application. Selected pesticide management techniques shall be included in IPM plan for the site.

<sup>2</sup> Refer to Nebraska Department of Agriculture and University of Nebraska Cooperative Extension publications and the pesticide label for additional information about effectiveness of pesticide management measures to protect water quality.

Pesticide Mgt Techniques	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff adsorbed	Description/requirements
Set-backs of at least 30 feet or greater next to streams and sensitive areas	N/A	+	+	+	N/A	N/A	Setbacks between application areas and sensitive areas (includes no application in sensitive area) will reduce application area and amount of pesticide applied, or inadvertent pesticide application and drift to surface water and exposure potential. If the pesticide label calls for greater setback they must be adhered to.
Soil Incorp. within 24 hours	N/A	-/N/A	++	-	N/A	N/A	Soil incorporation can decrease the potential for surface losses (no applications in sensitive area itself).

<sup>3 4</sup>Non-Cropland (i.e. grazing lands), or Cropland Conversion Practices

Conservation Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff adsorbed	Description/requirements.
Brush Management (314)	N/A	+++	+++	+++	N/A	N/A	Use of mechanical brush control and/or prescribed burning in lieu of chemical controls.
Conservation Cover (327)	++	++	++	+	N/A	N/A	Retiring land from annual crop production can increase infiltration and leaching and decrease sediment transport and pesticide requirements.
Grade Stabilization Structure (410)	N/A	N/A	N/A	+	+	++	Grade stabilization can decrease headcutting and sediment transport in natural and artificial channels and capture sediment from runoff and provide residence time for sediment to settle out of runoff water.

<sup>3</sup> Selected conservation practices will be incorporated in the conservation plan.

<sup>4</sup> Refer to the Nebraska NRCS Field Office Technical Guide, Section V, for additional information about Conservation Practice Physical Effects.

Conservation Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff adsorbed	Description/requirements.
Pasture and Hay Planting (512)	++	++	++	++	N/A	N/A	Shifting land use to pasture and hayland can increase infiltration, leaching and organic matter, and decrease runoff and pesticide requirements.
Prescribed Burning (338)	-	+	+	+	N/A	N/A	Burning can increase sediment transport and reduce pesticide requirements.
Prescribed Grazing (528A)	+	-	+	+	N/A	N/A	Proper grazing can increase infiltration, leaching and cover while decreasing sediment transport and pesticide requirements.
Range Planting (550)	++		++	++	N/A	N/A	Shifting land use to rangeland can increase infiltration, leaching and organic matter, and decrease runoff and pesticide requirements.
Tree and Shrub Establishment (612)	+		++	++	N/A	N/A	Establishment of woody vegetation can increase infiltration and leaching and decrease erosion, sediment transport, and pesticide requirements.
Wetland Creation (658) Development or Restoration (657) or Constructed Wetland (656)	N/A	-	+	+	++	++	Wetlands can increase infiltration and leaching while decreasing sediment transport to surface water by capturing sediment from runoff and provide residence time for pesticides breakdown.

<sup>5 6</sup>Cropland Practices

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements.
Anionic Polyacrylamide (PAM) Erosion Control (450)	NA	1	+	++	+	++	Increases infiltration and deep percolation, reduces irrigation induced erosion and rill erosion on gravity irrigated fields.
Conservation Crop Rotation (328)	+/-	+	+	+	N/A	N/A	Conservation crop rotations where two or more crops (crops must be significantly different, i.e., corn-soybean rotation) can be used to break pest lifecycles to decrease pesticide requirements.
Conservation Crop Rotation with 50% legumes and/or small grain with row crops (328)	+	++	++	++	N/A	N/A	Conservation crop rotations where 50% are in small grains, legumes, or grasses (crops must be significantly different) can be used to decrease erosion and break pest lifecycles to decrease pesticide requirements.
Contour Buffer Strips (332)	+	+/-	+	++	N/A	+	Contour farming can increase infiltration and leaching and decrease runoff and sediment transport to surface water, less pesticides and nutrients are applied in grassed areas resulting in less leaching potential on some sites.
Contour Farming (330)	N/A	-	+	++	N/A	N/A	Contour farming can increase infiltration and leaching and decrease runoff and sediment transport to surface water.

<sup>5</sup> Selected conservation practices will be incorporated in the conservation plan.

<sup>6</sup> Refer to the Nebraska NRCS Field Office Technical Guide, Section V, for additional information about Conservation Practice Physical Effects.

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements.
Cover Crop (340)	++	+	+	++	N/A	N/A	Cover crops can increase organic matter and decrease erosion and movement of residual pesticides to surface and groundwater.
Cross Wind Ridges (589A)	++	N/A	+	+	N/A	N/A	Ridges installed perpendicular to the prevailing wind erosion and water flow direction can decrease transport of adsorbed pesticides.
Cross Wind Trap Strips (589C)	++	+	+	+	N/A	N/A	Strip of grass or suitable crops/crop stubble installed perpendicular to the prevailing wind erosion direction can decrease transport of adsorbed pesticides.
Deep Tillage (324)	+	N/A	+	+	N/A	N/A	Deep tillage can increase infiltration and leaching while decreasing runoff and wind erosion.
Field Border (386)	+	N/A	+	+	N/A	N/A	Field borders can decrease sediment transport and the extent of application areas; increase setback distances and provide beneficial insect habitat and habitat to cause pest insects to congregate.
Filter Strip (393)	+	+/-	+	++	N/A	N/A	Filter strips can decrease sediment transport and the extent of application areas; increase infiltration and leaching and setback distances; provides beneficial insect habitat; and habitat to cause pest insects to congregate.
Grassed Waterway (412)	+	+	+	++	+	++	Grassed waterways can increase infiltration and leaching and decrease sediment transport. (Apply with filter strips at the outlet and on each side of the waterway).
Herbaceous Wind Barriers (603)	++	N/A	+	+	N/A	N/A	Narrow strip of grass installed perpendicular to the prevailing wind erosion and water flow direction can decrease transport of adsorbed pesticides.
Irrigation Land Leveling (464)	N/A	+	+	+	N/A	N/A	Land leveling can increase irrigation application uniformity and decrease pesticide transport to surface and groundwater.
Irrigation System Sprinkler (442)	N/A	++	+	+	N/A	N/A	Converting existing irrigated fields from gravity/surface irrigation systems to sprinkler. Irrigation Water Management (449) must be applied.

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements.
Irrigation System Tail Water Recovery (447)	N/A	++	++	++	+	++	Tail water recovery systems can increase leaching and decrease sediment transport (irrigation water management must be applied).
Irrigation Water Management (449)	N/A	++	++	++	N/A	N/A	Controlled application of irrigation water can minimize pesticide transport to surface and groundwater.
Residue Management, No-Till, Strip Till (329A)	++	-	+	++	N/A	N/A	Leaving crop residues on the soil surface can increase infiltration and leaching and decrease erosion and sediment transport.
Residue Management, Mulch-Till (329B)	+	-	+	+	N/A	N/A	Leaving crop residues on the soil surface can increase infiltration and leaching and decrease erosion and sediment transport.
Residue Management, Ridge Till (329C)	++	-	+	++	N/A	N/A	Leaving crop residues on the soil surface can increase infiltration and leaching and decrease erosion and sediment transport.
Residue Management, Seasonal (344)	+	-	+	+	N/A	N/A	Leaving crop residues on the soil surface can increase infiltration and leaching and decrease erosion and sediment transport.
Riparian Forest Buffer (391) and Riparian Herbaceous Cover (390)	+	+	++	++	N/A	N/A	Riparian buffers can utilize and trap nutrients and chemicals in shallow groundwater and decrease sediment transport in surface flow.

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements.
Row Arrangement (557)	+	+/-	+	+	N/A	N/A	Establishment of crop rows on planned grades and lengths can decrease erosion and sediment transport. Leaching can be increased if row grade is flatter and decrease if drainage patterns are improved.
Sediment Basin (350)	N/A	-	++	++	+	++	Sediment basins capture sediment from water erosion and provide residence time for sediment to settle out of runoff water.
Stripcropping (585)	++	-	+	++	N/A	+	Contour stripcropping for runoff and water erosion, wind stripcropping for wind erosion control. Stripcropping can also reduce small concentrated flow areas when placed across flow areas.
Subsurface Drainage (606)	N/A	++	-	++	N/A	N/A	Collection and conveyance of drainage water can decrease leaching and sediment yield and increase aerobic pesticide degradation in the rootzone. Avoid direct outlets to surface water.
Surface Roughening (609)	+	-	+	+	N/A	N/A	Random roughness can decrease water and wind erosion and transport of adsorbed pesticides while increasing infiltration and leaching.
Terrace (600) Gradient	N/A (unless grassed)	-	-	++	+	++	Earthen embankments and/or channels constructed across the slope can increase infiltration and leaching while decreasing erosion and sediment transport.
Terrace (600) Flat Channel and Closed Outlet	N/A (unless grassed)	-	+	++	+	++	Earthen embankments and/or channels constructed across the slope can increase infiltration and leaching while decreasing erosion and sediment transport.
Windbreak/Shelterbelt Establishment (380)	++	+	+	+	N/A	N/A	Field Windbreaks installed perpendicular to prevailing wind direction within cropland fields.

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements.
Water and Sediment Control Basin (638)	N/A	-	++	++	+	++	Water and Sediment Control Basins capture sediment from water erosion and provide residence time for sediment to settle out of runoff water.

**Point Source Conservation Practices (Not applicable to non-point losses in agricultural fields)**

Practice	Wind Erosion	Leaching	Solution Runoff	Adsorbed to Sediment	Concentrated Solution Runoff	Concentrated Runoff Adsorbed	Description/requirements
Agrichemical Handling Facility (interim)	N/A	N/A	N/A	N/A	N/A	N/A	Use agrichemical-handling facilities for mixing and loading to decrease point source pollution potential.
Well Decommissioning (351)	N/A	N/A	N/A	N/A	N/A	N/A	Sealing and permanent closure of abandoned water wells can decrease point source pollution potential.

**REFERENCES:**

Aquatic Dialogue Group: Pesticide Risk Assessment and Mitigation Various Authors, 1994 Society of Environmental Toxicology and Chemistry, Pensacola, FL., pages 99-111 and Table 4-2.  
 USDA Natural Resources Conservation Service National Employee Development Center Nutrient and Pest Management Considerations in Conservation Planning Course materials  
 Field Office Technical Guide, Section V CPPE Matrix  
 USDA Natural Resources conservation Service Water Quality Indicators Guide Surface Waters SCS-TP-161, September 1989