



Reducing Herbicides in Surface Waters

Best Management Practices

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Herbicides have a proven record for cost effective weed control throughout Texas. They are applied to soils or plant surfaces and some control weeds for an extended period after application.

However, under some circumstances these herbicides may move from the application site into surface waters. Unfortunately, minute quantities of a few herbicides have been detected in Texas ground and surface waters.

The potential risks associated with the contamination of surface waters must and can be alleviated by the adoption of Best Management Practices. Many of these are common sense approaches that require relatively little time or money, while others may require significant amounts of both. How-

ever, we must act now if we are to keep effective herbicides available for future use.

The following practices will help eliminate or reduce the runoff of surface-applied residual herbicides into surface water. These management practices can help accomplish three major goals:

- Reduce herbicides in runoff;
- Reduce water and sediment runoff, and;
- Safely clean sprayers and dispose of containers.

Reduce Herbicides in Runoff

Apply Herbicides Accurately

Properly calibrated sprayers are a must for preventing over-application of herbicides. Consultants, agri-chemical suppliers, and government and state agency personnel can advise



Properly calibrate sprayers.

you on the many calibration techniques available.

Calibration should be done regularly. Surveys indicate that 26 percent of private applicators are applying at least 10 percent more herbicide than they intend. Over-application of pesticides not only wastes money but also increases the chance of pesticides finding their way into surface waters.

Minimize the off-target drift of herbicides into open bodies of water such as creeks, rivers or lakes. Proper nozzle selection and pressure adjustment, and the use of drift control agents, are simple approaches to solving this problem.

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Reduce Herbicide Rate

Apply only the minimum amount of herbicide necessary to control weeds. If the label allows, consider splitting the herbicide application into two treatments. One treatment can be applied early in the season and the second at a later date. In addition, the rate of any given herbicide may be reduced by combining it with other herbicides. Using herbicide combinations may broaden the spectrum of weeds controlled, and may reduce the need for additional applications later on.

Use Alternative Herbicides

If possible, use herbicides that are less environmentally sensitive. There are a number of such products that can be applied “as needed” for effective post-emergence weed control. Most of these products do not have long residual activity and pose little threat to surface water. However, these herbicides usually are more expensive to use, and application timing is critical. Weeds can be controlled effectively only when treated in the early stages of growth. If windy or wet weather prevents timely application, weeds may become uncontrollable and the competition from them can be disastrous.

Time Application Correctly

The potential for herbicide runoff and surface water contamination increases when a hard rain falls soon after herbicide application. When possible, apply herbicides early in the season before the typical early Spring rainy period. Some products are labeled for application up to 45 days before planting, and their residual activity ensures their effectiveness. Avoid applying

herbicides to wet soil when rainfall is expected within 24 hours. When rain falls on wet soil much of the water runs off the field rather than moving down into the soil profile. Any herbicide lying on the soil surface may be dissolved and move off the field in the runoff. It is important that the herbicide be moved into the soil during the first few minutes of a rainfall.

Incorporate Herbicides Before Planting

The labels for some herbicides specify that they can be incorporated into the soil prior to planting. This may sometimes improve weed control, because with incorporation rainfall is not required to move the substance into the soil before weed seeds germinate. Incorporation dilutes the herbicide into the upper 2 to 3 inches of the soil, thus reducing the risk of surface water contamination. This is an especially useful option for farmers who till the land before planting anyway. Even a very light incorporation with a rotary hoe is beneficial.

Use Integrated Weed Management

Minimize the use of herbicides by applying them on an as-needed basis along with cultural practices such as mechanical cultivation, crop rotation, narrow row spacing, rotary hoeing, and altered planting dates. Evaluate weed conditions on untreated areas of the field to determine whether you really need to use herbicides in a broad-scale, preventive approach. Apply residual herbicides only where weed infestations require their use, and use alternative herbicides elsewhere. County Extension agents and Extension specialists can recommend integrated weed management practices for various crops.

Band Herbicides

Banding herbicides over the crop row places the product in the area where it is most needed, yet reduces the total amount applied by 50 to 66 percent in most cases. Untreated areas between rows can be shallowly tilled to control most annual weeds. This practice can dramatically reduce the amount of herbicide that could be carried off



Band herbicide applications.

Practice contour farming.

the field in soil erosion or water runoff. The money saved by applying less herbicide helps offset any increased tillage expense. In many cases, banding is the best application method in terms of both herbicide cost and effective weed control.

Lightly Irrigate After Application

If possible, lightly irrigate soon after herbicide application to move the product into the top 2 inches of the soil and reduce the potential for runoff. Generally, $\frac{1}{2}$ to $\frac{3}{4}$ of an inch of water applied by sprinkler irrigation is enough to move most herbicides into the soil profile.

Consider Site-Specific Factors

Certain cropland sites are more vulnerable to surface water runoff than others. For example, soils with high clay content on sloping sites with little plant residue on the surface are at high risk. Rain-fall or irrigation on such sites can easily transport herbicides, either on moving soil particles or in the surface water runoff itself. In such situations the best approach might be to apply herbicides that control weeds postemergence, and that have little residual activity. Such products could be used on an as-needed basis. Consult with your local NRCS personnel to get a site assessment based on soil texture, slope and residue parameters.



Observe Setback Areas

Many herbicide labels require the applicator to observe spray setback distances from outlets to streams, rivers and lakes. A setback distance from wells for mixing and loading operations often is required. Any setback requirements on a herbicide label should be strictly followed. If specific directions are not given on the label, avoid spraying herbicides within 50 feet from wells, 66 feet from outlets to streams or rivers, and 200 feet from lakes. Do not mix or load herbicides within 50 feet of a well.

Reduce Water and Sediment Runoff

Best management practices that reduce water and sediment (soil) runoff generally require more drastic changes in management and are more expensive than changing herbicide application methods. However, in areas where the soil type, land slope or land use cause great risk of surface runoff, these practices should be considered.

Consider Contour Farming

Contour farming is the practice of planting and tilling a crop across a slope rather than up and down the slope. This practice can reduce the amount of soil lost from the field to as little as a third of that lost from clean till fallow. Adopting residue management practices further reduces soil loss. If end rows are left to run up and down the hill the benefits of contour farming are greatly reduced. Instead, use grass field borders as turn rows at the ends of your field.

Terrace the Land

Land terracing is a more drastic form of contour farming. It consists of constructing a series of large, nearly parallel ridges that run at a slight grade across the slope. These ridges are permanently maintained and collect the runoff from most rains. The excess water that collects behind the ridges can be channeled off to appropriate areas to reduce the risk of environmental contamination.



Safely Clean Sprayers and Dispose of Containers

Carefully follow all label directions for cleaning sprayers and disposing of herbicide containers. Disregarding these procedures can easily lead to concentrated doses of herbicide being deposited on the soil surface and possibly entering nearby surface waters. In the case of accidental spills, immediately clean up the site using appropriate procedures. Mixing and loading on an impervious pad will make clean up easier should spills occur during these operations.

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Try Furrow Diking

Furrow dikes are mounds of soil mechanically placed in the furrow between crop rows, creating a series of small dams. When rainfall exceeds the soil's infiltration rate, the dikes hold the water until it has time to soak into the soil. This practice is especially beneficial in dryland agriculture.

Plant Grass Filter Strips or Grass Waterways

Placing grass filter strips between herbicide application sites and bodies of water helps reduce sediment runoff. Strips are effective if runoff spreads out evenly as it crosses the filter strip and is not concentrated into streams. Filter strips usually are 15 to 25 feet wide. Grass waterways reduce water and soil runoff that occurs during light rainfall, but are less effective when rainfall is heavy. Never plant crop rows up and down the side of the waterway. Where grass waterways are established, contour rows should enter the

grass areas nearly on the level, but directed into the waterway.

Increase Surface Residue

Use cultural practices that increase the amount of plant residue remaining on the soil surface. This usually requires the adoption of no-tillage or reduced tillage practices, and may also mean changing crop rotation patterns. Increasing the amount of plant residue on the soil surface greatly reduces water runoff from fields. Practices that increase surface residue can be used alone or in combination with other Best Management Practices.



Clean containers properly.

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