Improved Pesticide Application BMPs for Groundwater Protection from Pesticides

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Reducing or eliminating the use of highly mobile or persistent pesticides generally reduces the potential for groundwater contamination. This is particularly true for areas with coarse textured soils and shallow water tables.

If it is not feasible to substitute other pest control products or methods for highly mobile or persistent pesticides, improved application or target efficiency becomes extremely important.

Detailed discussion of best management practice (BMP) implementation for improved pesticide application is found in the references listed at the end of this factsheet. Each reference title includes the source of information and the related BMP numbers.

BMPs

1. Use pesticides with low mobility and persistence.
Often there are no substitutes that provide the desired pest control offered by certain highly mobile pesticides. The best alternative in this situation is using management practices that reduce pesticide applications while still maintaining the desired pest control. Product labels indicate where and under what conditions mobile pesticides should not be used.

2. Use pesticide formulations that reduce drift losses.
Generally granules and pellets reduce drift compared to dusts, wettable powders, and fine liquid sprays.

3. Adjust spray equipment to give the range in droplet size for optimum coverage of the target.
The optimum range in droplet size will reduce drift to a minimum and provide maximum dispersion and target coverage.

4. Release pesticide spray as close to the target as possible.

5. Never apply pesticides during weather conditions that may cause significant drift of small droplets away from the spray target.
Windy conditions or air conditions created by a temperature inversion (cold air trapped between the soil surface and warm air above) generally contribute to pesticide drift. Vertical movement of small droplets is reduced under theseconditions and lateral drift is increased. Many pesticide labels recommend spraying only when wind speeds are 10 mph or less.

6. Calibrate application equipment regularly to ensure that the proper amount of pesticide is applied.
This simple activity is required by law and avoids overapplication of pesticides and underapplications that result in the need for additional applications because pests were not adequately controlled with the first application. Sprayer calibration and nozzle maintenance have large effects on application efficiency.

7. Add petroleum or modified vegetable oil adjuvants to herbicide mixes, when recommended.
Adjuvants have been shown to increase the effectiveness of many herbicides. Increasing herbicide effectiveness means the total active product can be reduced without loss of pest control.

8. Utilize banded applications of pesticides when possible.
This will reduce the amount of pesticide used compared to broadcast applications. However, under some circumstances, such as coincidence of ammonia injection furrows and pesticide bands, this practice may increase movement of the pesticide through the soil. Also, in some areas additional cultivation required for weed control due to banding has not been acceptable to producers.

9. Utilize methods of pesticide application that target individual pests or improve uniformity of application if possible.
Some of these techniques, such as wick applicators, have been around for years, and others, such as injection sprayers, make use of the latest innovations in computer technology and geographical referencing.

10. Use pesticides that can be incorporated into the soil, if possible.
This will help to reduce losses due to volatilization and surface runoff, improving pest control and reducing the need for greater amounts of active ingredient or additional applications. However, this practice may increase the amount of pesticide that leaches through the soil.

11. Avoid pesticide applications prior to intense rainfall events.
The largest losses of pesticide occur during the first runoff event after application. The amount of loss decreases with each additional day between application and intense rainfall.

12. Check mix-water for pH and minerals that may reduce pesticide efficacy.
The chemistry of the mix water may drastically reduce the ability of some pesticides to control pests. Generally, insecticides are more sensitive to pH and herbicides are more sensitive to mineral constituents such as calcium, magnesium, and sodium. Consult the pesticide label for recommendations about how to maintain efficacy with varying water quality. Maintaining pesticide efficacy reduces overall use of pesticides, and off-target movement is less likely to occur.

Further Information

This circular is one of seven **GROUNDWATER/PESTICIDE FACT SHEETS**. Please refer to the following fact sheets for additional information.

- AE-1110 What is the BMP Selection Process for Groundwater Protection from Pesticides?
- AE-1111 How is the Assessment Process for Ground-water Contamination from Pesticides Used for BMP Selection?
- AE-1112 Farmstead BMP Recommendations for Groundwater Protection from Pesticides
- AE-1113 Improved Pesticide Application BMPs for Groundwater Protection from Pesticides
- AE-1114 Integrated Pest Management (IPM) BMPs for Groundwater Protection from Pesticides
- AE-1115 Soil and Water Conservation BMPs for Groundwater Protection from Pesticides
- AE-1116 Irrigation BMPs for Groundwater Protection from Pesticides

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References

An Assessment System for Potential Groundwater Contamination from Agricultural Pesticide Use in North Dakota NDSU Extension Bulletin No. 63 **BMP1**
Spray Equipment and Calibration NDSU Extension Bulletin AE-73 **BMP3 BMP6**
Calibrating Granular Pesticide Applicators NDSU Extension Circular AE-888 **BMP6**
Chemical Applications in Agriculture - Methods and Equipment for Field Sprayers North Central Region Extension Publication No. 520 **BMP9**
North Dakota Field Crop Insect Management Guide NDSU Extension Bulletin ER-22 **BMP12**
North Dakota Weed Control Guide NDSU Extension Bulletin W-253 **BMP12**
The Effect of Water pH on Pesticides NDSU Extension Handout **BMP12**

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