



# IRRIGATION FACTS

Cooperative Extension Service  
South Dakota State University

## Chemigation Management

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Using irrigation systems to apply agricultural chemicals with the water is called chemigation. Liquid nitrogen fertilizer is the most common chemical applied this way, but insecticides, herbicides, fungicides, nematicides, and growth regulators also can be applied with irrigation water. Sprinkler irrigation is suited for most chemigation applications including both soil and foliar chemicals.

Chemigation is one of the best ways to apply many agricultural chemicals. It optimizes production and reduces potential environmental hazards. But, safe and effective chemigation requires top-level management by the operator.

Irrigation systems used for chemigation must have the required antipollution safety devices and the appropriate injection equipment installed, and the entire system must be in good working condition. In addition, the irrigation and chemigation equipment must be maintained and operated properly.

### Irrigation Equipment

Before starting chemigation, make sure your irrigation system is suited to the task. It should be designed and equipped for chemigation. And, it must be reliable. Do not use equipment that's prone to malfunction and shut-down.

The irrigation system must apply water uniformly, especially when releasing pesticides. Test the spray uniformity before chemigating. Some types of sprinkler systems may not be well suited for chemigation because of uneven application.

Inspect the system before each application for plugged or broken sprinklers. Check that the end gun shutoff is operating properly to make sure chemicals will not be applied to non-target areas.

### Chemigation Equipment

Inspect and test chemigation injection and safety equipment before each chemigation application. Extension fact sheet, FS 860, covers chemigation safety equipment in detail.

Be sure the interlock between the irrigation pump and injection pump is operating properly. The injection pump should stop whenever the irrigation pump stops.

Make sure the irrigation pipeline check valve is not leaking. Turn on the irrigation pump to pressurize the system, then turn it off and open the inspection port to check for leaks. Also verify that the low pressure drain is not plugged.

Inspect the injection line check valve. First, disconnect the hose from the check valve and observe if there is any leakage past the check valve when the irrigation system is pressurized. Then disconnect the check valve from the irrigation pipeline and reattach it to the injection pump. Operate the injection pump to pressurize the chemical injection line. Now shut off the pump and observe whether leakage occurs through the injection line check valve.

Inspect all hoses, clamps, and fittings for leaks. Replace any defective parts. Check the suction strainer at the chemical supply tank and clean or replace it as needed.

Make sure the supply tank doesn't leak and that any spills would be contained without getting into the well or ground water.

Do not chemigate during periods when the pump and irrigation system may be placed under electric load control, unless the equipment is closely monitored for shutdown.

## **Calibrate the equipment**

Calibrating the injection equipment is essential. Otherwise, it's impossible to determine the amount of chemical being applied during chemigation.

Calibration is especially critical when applying pesticides since pesticides have labeled application rates. Too little chemical will likely result in poor performance. Too much chemical could damage the crop and environment. Either way, it's a waste of money.

Calibration is not difficult but does require time, accurate calculations, and the right equipment. It may be a good idea to put valves on the first sprinklers on center pivot irrigation systems so chemical spray can be shut off at the injection site when necessary.

Be sure to use the appropriate safety equipment and clothing when calibrating and operating the chemigation equipment.

Extension fact sheet FS 863 Chemigation Calibration tells how to calibrate the chemigation system together with the irrigation system. For further assistance, contact your local county Extension office.

## **Flush equipment after use**

Flush the chemical injection pump and other equipment with clean water after each use. This will minimize corrosion and accumulation of precipitates. After chemigation is completed, operate the irrigation pump long enough to flush the chemical out of the irrigation system. For most systems, 10 to 15 minutes of flushing is adequate.

## **Read and comply with the product label**

Follow all label instructions when applying pesticides in the irrigation water. Do not use any pesticide unless the product label specifically includes chemigation application. Apply the pesticide only to labeled crops and at labeled rates. Be sure to follow any label restrictions, such as posting the field, or requirements for additional safety equipment.

## **Wind drift, runoff and leaching**

Do not apply chemical if there is a chance of drift onto nontarget areas. Night application may reduce drift

potential but may complicate monitoring of the equipment.

Do not allow any chemical/water mixture to runoff into surface water. It's especially critical to control runoff of chemicals when using surface irrigation methods.

Avoid over-irrigating to keep chemicals from leaching below the root zone and into the groundwater. Good irrigation management practices are essential throughout the growing season to minimize leaching potential.

## Chemigation Monitoring

During any chemigation application, periodically monitor the irrigation system and chemical injection equipment to be certain that both are operating properly. Monitoring is particularly important if there is a chance for loss of electric power such as from load management control.

## Record-keeping and reporting

South Dakota state law requires that an irrigator must register each year with the Department of Water and Natural Resources before using chemigation. Register before the irrigation season to avoid last minute pressure.

The irrigation operator also is required to keep records of each chemigation application including the type of chemical, date and amount applied. Information from these records is used to complete the annual report to the Department of Water and Natural Resources.

## Accidental spills

Even with good equipment and management, a chemical spill is possible. Examples of accidental spills would include siphoning of chemical or chemical mixture into the water supply or leakage from the supply tank. State law requires that all spills involving actual or potential contamination of the water supply must be reported.

In case of an accidental spill, protect yourself and other persons from the chemical. If necessary, confine the spill by constructing a dike to prevent the chemical from getting into surface or ground water.

## Conclusion

Safe and effective chemigation requires good management. It is the operator's responsibility to ensure that safety equipment is installed, that it's functioning properly, and that the system is calibrated to apply the right amount of chemical with the water.

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