• Impending weather conditions should, of course, be considered. In order to provide sufficient storage capacity in the event that rainfall follows irrigation, the soil should not be completely saturated.

• Nighttime irrigation can result in substantially higher irrigation efficiencies due to reduced evaporation. For example, a sprinkler system which operates at 70% efficiency during the day may operate as high as 90% efficiency at night.

Plant wilting has been used extensively for irrigation scheduling in the past; however, it has been shown that potential yields may have already been reduced before reaching this point. Traditional methods, such as “soil feel” and soil probe techniques, can be used with reasonable success after the irrigator has gained considerable experience.

Modern techniques for irrigation scheduling recommended for Virginia’s conditions include the use of tensiometers, electrical resistance meters, evaporation pans, and moisture accounting methods. It is further suggested that two methods be used concurrently as checks on each other.

FERTIGATION / CHEMIGATION BMPs

Producers can utilize many types of irrigation systems to safely apply fertilizers and chemicals to their crops. A few guidelines will help assure that these materials do not become pollutants.

• Injection systems should include the use of appropriate check valves and anti-siphon devices to prevent backflow of fertilizer and chemicals into water bodies.

• Chemicals should be mixed and injected in areas that are located well away from water bodies and wells, and provisions should be made to contain any spills which might occur.

• Producers should give special attention to calibrating injection equipment to assure that intended rates are applied to the crop. Recommended rates of either chemicals or water should not be exceeded; excessive amounts waste money and can easily be carried with runoff or groundwater seepage into water sources.

• Consider weather conditions and soil moisture status. In most cases, applications shortly before or after rainfall or irrigation can greatly increase the potential for NPS pollution. Chemical application should be avoided when wind could carry nutrients or chemicals into streams, lakes, or the irrigation pond.

CONCLUSION

We ALL need Clean Water. It is essential to life—to our social, cultural, and economic well being. Clean water is especially important to agricultural producers who use it for watering livestock, cleaning equipment, processing, and irrigating their crops.

If Virginia’s voluntary approach to NPS pollution is to be successful, all of us must look at our operations and ask, “Has my production contributed to nonpoint pollution?” Your local VCE agent can help you answer this question.

Technical assistance for the planning, design, and implementation of Best Management Practices is available from your local Soil and Water Conservation District office and from the USDA-Natural Resources Conservation Service.
INTRODUCTION

Increased concern for the deteriorating quality of our nation’s waters, such as the Chesapeake Bay, has led each state to adopt and promote nonpoint-source (NPS) pollution control measures. NPS pollution results from runoff, snow melt, or groundwater seepage from industrial, municipal, and agricultural sites. NPS pollution often goes unnoticed; however, it is extremely widespread and makes a significant contribution to our overall water pollution problem.

All forms of agricultural production can contribute to NPS water pollution. Fertilizers, pesticides, chemicals, wastes and sediment may be carried into surface waters by runoff or seep into groundwaters when improperly managed. Irrigation practices can increase the risks of such contamination.

Virginia’s approach to the problem of NPS pollution is primarily through voluntary programs and education of its citizens. Agricultural producers are encouraged to adopt Best Management Practices, called BMPs. BMPs, which include management, structural, and agronomic measures, are sound, common-sense conservation practices that will result in water quality improvements.

While irrigators encounter the same NPS pollution problems that all crop producers face, they can take positive measures to prevent irrigation from contributing to pollution. In addition to creating problems due to sedimentation, nutrient enrichment, and chemical poisoning, irrigation runoff and excessive leaching represent wasted water and energy.

DESIGN BMPs

The design of the irrigation system can have a significant effect on the potential for NPS pollution as well as operating efficiency and costs. It is the responsibility of the irrigation system designer to select an appropriate system to meet the needs of the crop and to consider soil and water conservation. One of the first considerations when selecting an irrigation system should be its adaptability to the soil and terrain.

• Because of high application rates, low-pressure center-pivots are best suited to flat terrain and soils with high infiltration rates. Higher-pressure center-pivots, on the other hand, may be adaptable to rolling terrain because of lower application rates.

• Portable pipe and solid-set sprinkler-system design is adaptable enough to accommodate a wide range of soil conditions and terrain. The right combination of pipe spacing, sprinkler heads, and pumping capacity can limit the runoff-producing potential of the system.

• Drip irrigation and other low-volume systems are particularly well suited to steeper slopes and heavier soils since runoff is practically eliminated. Because of high water-use efficiency, these systems are ideal where water supplies are limited and runoff potential is high.

Relocating systems to field and crop conditions different from those for which they were designed can often lead to runoff problems. An irrigation designer or consultant should be contacted when buying a used system or relocating an existing one to assure that its design application rate is appropriate. A consultant should also be contacted when there is excessive runoff from an existing system.

MANAGEMENT BMPs

Conscientious management of both the system and the irrigation water is as important in pollution control as proper design. In addition, good management almost always translates into water and energy savings, thereby increasing productivity per dollar invested.

• Proper irrigation scheduling requires monitoring the soil moisture conditions. In addition, it is important to know the waterholding capacity of the soil in determining the amount of water to be applied, as well as other soil properties that impact water availability and use.

• Attention should also be given to how the water needs of the crop vary depending upon the stage of growth. For example, corn is not as susceptible to moisture stress during its early vegetative stage as it is during tasseling and silking.

System Management

Producers should develop a familiarity with their systems in order to insure proper and efficient operation. Periodic observation and inspection of the system, as well as a regular maintenance program, will establish this familiarity and identify problems.

The actual amount of water applied by sprinkler irrigation systems should be determined by averaging the depth of water collected in several rain gauges distributed throughout the irrigated field to verify that the expected amount of water is being applied. In drip irrigation, water meters are invaluable for accurate water application measurement.

In the case of self-propelled systems, such as center-pivots and travelling guns, the travel speed should be checked periodically. Maintaining records of fuel consumption and pressure gauge readings will also help operators foresee developing problems. Periodic inspection of pumps, controls, pipes, and sprinklers is also advisable. When these components wear out, design discharge may be affected. Prompt attention to problems such as line breaks and leaking seals can prevent needless waste.

Water Management

The primary objective of water management is to apply the right amount of water at the right time while maintaining the higher yields attributable to irrigation. Proper irrigation scheduling can result in significant savings in irrigation time, labor, energy, and water. By carefully managing the amount of water applied, leaching of nutrients and erosion can be reduced. Plants susceptible to disease impacted by excessive moisture may also benefit.

• When irrigation is a regular maintenance program, will establish this familiarity and identify problems.