

5.2 Gated and Flexible Pipe for Field Water Distribution Systems

Applicability

This BMP is applicable to agricultural producers that currently use unlined ditches to distribute water to furrow or border irrigated fields.

Description

Gated pipe or flexible pipe (commonly called poly-pipe) is used to convey and distribute water to the furrow and border irrigated fields. Gated pipe is made of aluminum or PVC and ranges in diameters from 6 inch to 12 inch and lengths of 20 or 30 feet. Ports or gates are installed in the side of the pipe at 20 inch, 30 inch, 36 inch, or 40 inch intervals. The flow rate out of each gate is controlled by the percent opening of the gate.

Flexible pipe is a very low pressure (less than 5 psi) thin wall (less than 25 mil) pipe that is unrolled and can have ports installed after the pipe is pressurized. Flexible pipe is available in 12 inch through 21 inch diameters in roll lengths of 1,320 feet. Flexible plastic pipe can also be used as a surface pipeline to convey water between fields and can improve the application efficiency of furrow irrigation by allowing the delivery of larger stream sizes of water per irrigated row.

Implementation

This BMP is often implemented simultaneously with the replacement of an on-farm ditch with a pipeline. The steps required to implement this BMP are:

1. Selection of the diameter of the gated pipe or flexible pipe to match the desired flow rate to the irrigated field, and
2. Purchase and installation of the gated or flexible pipe.

Schedule

This BMP can be implemented in one or two days if the on-farm water delivery system is adaptable to gated or flexible pipe.

Scope

Both gated pipe and flexible pipe are laid out after the rows or borders are prepared and removed after the last irrigation of the season. Gated pipe has a long life cycle (10 to 40 years), whereas flexible pipe is typically used only one or two seasons before it must be replaced. Both gated pipe and flexible pipe are easy to install and remove. Flexible pipe installs faster than gated pipe and can be purchased in larger diameters than gated pipe. The larger diameter pipe will deliver more water per acre to the field and can facilitate the farmer improving irrigation application efficiency. Both gated pipe and flexible pipe are typically connected to a buried pipe via a pipeline riser with a hydrant. The hydrants for gated pipe and flexible pipe are different and are not interchangeable. Typically gated pipe uses a “bonnet” type hydrant and

flexible pipe uses a “duck’s nest” type hydrant. Surge irrigation is commonly used in conjunctions with gated pipe.

Documentation

To document this BMP, the agricultural water user shall document and maintain one or more of the following records:

1. Photographs of the gated or flexible pipe installed; and
2. Receipts or other documentation.

Determination of Water Savings

The amount of water saved by switching from an unlined ditch to gated or flexible pipe can be estimated by the amount of water that was lost to seepage from the unlined ditch. Seepage rates vary with soil type and local conditions. The information in the Lining of On-Farm Irrigation Ditches BMP can be used to estimate the amount of water saved from seepage. Gated and flexible pipe can also increase the amount of water delivered to each row and reduce deep percolation of irrigation water near the head of the field. Estimation of the amount of water saved from increasing the irrigation application efficiency can be made by measuring the amount of water delivered to the field prior to installing gated or flexible pipe and comparing it to the amount of water delivered to the field using gated or flexible pipe. Under most situations, the water saved by increasing irrigation application efficiency will be significantly greater than water savings from reducing the amount of water lost to seepage.

Cost-Effectiveness Considerations

The cost for 12 inch diameter PVC gated pipe ranges from \$2.00 to \$2.50 per foot and flexible pipe between \$0.15 and \$0.20 per foot. For a field length of 1300 feet with a row spacing of thirty-six inches it takes approximately 34 feet of gated or flexible pipe per acre. Because the life cycle for gated pipe is significantly longer than that of flexible pipe, the annualized price of PVC gated pipe is similar to flexible pipe. Assuming that 0.25 acre-foot per acre per year of water is saved by using gated or flexible pipe, the annual cost per acre-foot of water saved ranges from \$20 to \$25.

References for Additional Information

1. *Irrigation Water Conveyance, Rigid Gated Pipe*, Natural Resources Conservation Service, United States Department of Agriculture, October 1985, National Conservation Practice Standards No. 430HH.