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# Reducing Soil Losses With Filter Strips

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Higher fertilizer costs and nonproductive field ends are the prices growers pay directly for soil erosion caused by furrow irrigation. Soil erosion damage, however, does not stop at the field boundary. Topsoil carried off in tailwater also affects downstream water users. Sediment in irrigation runoff increases costs for canal and ditch maintenance; causes excessive wear on turbines, pumps and sprinkler nozzles; increases labor; and adds nutrients and sediment to downstream reservoirs.

A sure sign of erosion damage to a field appears as a rounded or convex shape on the field's lower edge. Many times this area is not even planted because of continued deep furrow erosion and low yields (Fig. 1).

## Filter Strips

One simple yet cost effective method that reduces soil losses from 40 to 60 percent in a field growing row crops consists of planting a narrow strip of grain, grass or alfalfa along the bottom of the field just above the tail water ditch (Fig. 2).<sup>\*</sup> Filter strips work because they slow down water at the end of a furrow, allowing sediment time to settle out before runoff water enters the tailditch (Fig. 3). Sediment deposited in a filter strip helps to reshape the bottom of a field, partially correcting erosion and infiltration problems caused by rounded field ends. Erosion damage to a field is greatest where water runs on and off the field.

<sup>\*</sup>University of Idaho Department of Agricultural Economics study.



Fig. 1. Low productivity on sloping field ends or the need for a turning strip means the bottom of many fields are not even planted. This condition can be corrected with a filter strip.



Fig. 2. A strip of small grains, grass or alfalfa established at the bottom of a field in row crops can effectively reduce soil lost during a season's irrigation by as much as 80 percent.



Fig. 3. A filter strip works on the principle that the less energy a stream of water has, the less sediment it can carry. When runoff water carrying sediment enters the filter strip, the stream slows down and spreads out. Extra sediment that can no longer be carried settles out while water continues on through to the tailditch.

Filter strips will keep eroded soil from leaving a field; however, they do not affect how much erosion occurs in the furrow above the filter strip. Keeping soil in place on a field can be accomplished by improving irrigation practices, compacting furrows, reducing cultivations or keeping crop residues in the furrow.

Filter strips are generally not effective on field slopes greater than 2 percent (2 feet of fall in 100 feet) because of the quantities of sediment generated. On fields where the cross slope is greater than 1 percent, a high risk of cross slope channeling exists which also reduces the effectiveness of your filter strip.



Fig. 4. This photo shows a dead furrow left in front of a filter strip and the effects of cross slope channeling. Tailwater left the field without entering the filter strip. This problem can be eliminated by pulling the furrow 1/3 of the way into the filter strip.

## Installation and Operation

To be effective, filter strips should be at least 8 feet wide. Actual width will be determined by your planter sprayer and harvesting equipment. The filter strip will be your turning area during field operations.

Seeding rates for grain filter strips should be the normal seeding rate for that crop. Sediment removal by a filter strip is related to stand thickness, not always related to seeding rates. Tests at Kimberly, Idaho showed that doubling or tripling the normal seeding rate did not change the amount of sediment removed by the filter strip.

Your filter strip must have sufficient vegetative growth (roughly 3 to 4 inches) for it to function during the first irrigation. As much as half of an entire season's soil loss occurs during that first irrigation on cultivated row crops. Planting a filter strip in the fall could be your best choice on crops such as sugarbeets, requiring early irrigation or when planting filter strips in the spring would interfere with other farm operations.

An established grass or alfalfa strip left behind after stand removal is also an effective filter strip. These could even be left as permanent filter strips but would need to be maintained. When using an established crop, remember not to leave a dead furrow in front of the filter strip. A dead furrow acts as a ditch channeling water in front of the filter instead of permitting it to pass through (Fig. 4). Similarly, avoid establishing a berm at the bottom of the filter strip where it borders the tailditch.



**Fig. 5.** A frequent mistake when installing filter strips is to pull the furrow slicker all the way through the filter strip as shown here. When this happens, the filter strip does not slow water in the furrow before entering the tailditch making the filter strip ineffective.

When putting in furrows, pull the furrow or corrugate one-third of the way into the filter strip. This will reduce cross slope channeling and ponding and assure even distribution of runoff through your filter. However, do not pull the furrow all the way through the filter strip. This destroys the filtering effect (Fig. 5).

At the end of the season, unless the filter crop is to be left for wildlife, work the filter area like the rest of the field. This will keep the field level and avoid any dead furrow problems.

## Choosing a Filter Strip Crop

Any close-growing vegetation can be effective in filtering runoff. Choose a filter strip crop that fits easily into your farming operation. Most operators find small grains easiest to work with although a previously established grass or alfalfa strip is also effective. Also, consider the height of a filter strip crop during the season's cultivations.

Another important consideration when deciding on a filter strip crop is the need to minimize herbicide damage. Even when the filter strip is not sprayed directly, herbicide movement by water or soil particles can severely damage a filter strip making it ineffective. One example of a mismatch would be the use of atrazine on a corn field with a grain filter strip. Herbicide carryover from the previous year's crop can also be important.

When any pesticides used on the field crop are not labeled for the filter strip crop, the filter strip should not be harvested. In order to harvest your filter strip crop, your pesticide applications must follow label rates and precautions for the filter strip crops to avoid illegal pesticide residues.

Finally, take into account your rotation when selecting a filter strip crop. If a fall grain is planted in the spring as a filter strip crop, be sure the filter strip is worked up 3 weeks before planting the next grain crop in the field. This will eliminate the possibility of aphids surviving to infest the next crop and prevent the spread of wheat streak mosaic.

## Conclusion

Loss of valuable soil fertility and downstream sediment damage do not have to be prices paid by irrigators. Filter strips are just one of many practices that are available to help control sediment losses. Idaho is relying on the voluntary cooperation of its farmers and ranchers to reduce the volume of agricultural pollutants, mostly sediment and nutrients, that enter Idaho's waters.

If you would like additional information on filter strips, other soil saving management practices or assistance with irrigation water management, contact your local Soil Conservation Service District Conservationist or your University of Idaho Extension county agent.

## When Using Filter Strips

### Do

- Choose a filter strip crop that fits your farming operations.
- Seed grain filter crops at the normal planting rate.
- Pull furrows only one-third of the way into the filter strip when corrugating.
- Permit the filter strip to become established before the first irrigation.
- Plan pesticide usage to minimize effects on filter strip crops. Follow label restrictions.
- Follow sound irrigation practices.

### Don't

- Leave a dead furrow in front of a filter strip.
- Use filter strips on fields with more than a 2 percent slope or having a cross slope greater than 1 percent.
- Pull furrows all the way through the filter.
- Make a berm between the filter strip and the tailditch.
- Plant filter strips less than 8 feet wide.
- Harvest a filter strip when a pesticide not labeled for the filter crop has been applied.



**Fig. 6.** Create a sediment pond large enough to collect a season's sediment loss from a field.



**Fig. 7.** Mini-basins are small sediment ponds each collecting tailwater from only 5 to 10 furrows.

## Alternative Erosion Preventions

You can use several other practices to reduce topsoil carried off in your drain ditch (Figs. 6, 7 and 8). All work by slowing tailwater to allow sediment to settle out.

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**Fig. 8.** A buried drain runoff system gets rid of your tailditch entirely, placing it underground. Tail water enters by means of the riser seen in the foreground.

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