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MANAGING AND MAINTAINING VEGETATIVE FILTER STRIPS ON RILL-IRRIGATED ROW FIELDS

By
Dr. Brian W. Bodah, Pierce County Director, Washington State University Extension, **Dr. Jeffrey L. Ullman**, University of Florida, Department of Agricultural and Biological Engineering, **Mark Stannard**, Manager, USDA-NRCS Pullman Plant Materials Center, **Dr. R. Troy Peters**, P.E., Washington State University Extension Irrigation Specialist, Department of Biological Systems Engineering, **Dr. William Pan**, Professor, Washington State University, Department of Crop and Soil Sciences

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Managing and Maintaining Vegetative Filter Strips on Rill-Irrigated Row Fields

Vegetative filter strips (VFSs) can be effective best management practices (BMPs) for improving water quality. However, if a VFS is not properly managed, this can decrease its efficiency in removing pollutants. Under poor management, these systems can become ineffective, interfere with the movement of water into the irrigation return drain, create a weed bed, or become unsightly. This portion of the WSU Extension series on VFSs describes management considerations for maintaining an effective VFS that mitigates off-field movement of contaminants and does not impede agricultural production. Although a focus is placed on managing VFSs located at the end of rill-irrigated fields in the state of Washington, the concepts are applicable to VFSs implemented in other situations and locations as well.

Regular inspection and reseeding

Despite a farmer's best attempts, bare spots will emerge within a VFS due to a variety of reasons. Bare patches have no treatment capacity and are simply wasted space. VFSs should be inspected on a regular basis to check for the development of bare spots, and these areas should be reseeded as needed.

Mowing

Mowing your strip on a regular basis stimulates the development of a thick stand of vegetation that is essential for effective VFS function. In order to maintain a dense, effective stand of vegetation, strips should be mowed to a height of 4 inches (6 inches in areas with particularly sandy soil to ensure grass roots are secure) on a regular basis. If you are managing the strip as a hay or forage crop, vary the height cut and harvest intervals to the haying guidelines specific to your region and crop. Mowing the area on a regular basis also discourages wildlife from taking up residence within the VFS. (Different types of buffer strips can be used if wildlife promotion is desired, but in this case, VFSs are used exclusively to mitigate water quality issues.) Wildlife burrows, tunnels, and the matting of tall grasses by animals bedding down can significantly impact VFS treatment efficiencies. Mowing can also be used as a means of weed control in areas where the application of herbicides is not advised, is prohibited, or is simply not desired. This is particularly true near waterbodies that contain salmonids and other sensitive aquatic species

Figure 1: Weeds should be targeted early and consistently to avoid competition with VFS vegetation. (Photo by B. Bodah)

Weed control

The early and continued control of weeds is paramount for maintaining VFS effectiveness. Many weed species can easily outcompete and shade out the grasses or other target species that make up the strip (Figure 1), significantly impacting overall sediment and nutrient removal rates by reducing the treatment area.

The application of a broadleaf herbicide early in the growing season can greatly increase stand development in grass buffer strips. Herbicides should only be utilized where permitted, but they are generally regarded as the easiest and most effective way to suppress weeds within a VFS. Repeated applications may be required to help establish adequate grass stand development in addition to a decreased weed seed bank for maximum strip effectiveness. Herbicides can also be utilized to suppress weeds in non-grass VFSs. Consult your local Extension agent when selecting which herbicides to use depending on the species that comprise your VFS.

It is highly likely that you will be applying different herbicides to your VFS as compared to your crops. In modern agriculture, herbicides are commonly applied utilizing sprayers that cover a wide swath of area at one time.

Figure 2: Herbicide drift killed the bottom portion of this VFS. Note the return flow ditch at bottom. (Photo by B. Bodah)

During application, adjoining areas may also be impacted if the wind blows the herbicide onto non-target areas. Many of the herbicides used to suppress weeds in current row crops also target grass, hay, or forage species that would comprise a filter strip (Figure 2). Avoiding herbicide drift is of great importance when maintaining the vegetation comprising a VFS. Farmers should skip the pass directly adjacent to the filter strip while spraying the remainder of the field and spray that portion at a later time with a more precise instrument, such as an ATV attachment or backpack sprayer. While this approach may have an impact on the required man hours, applicators have a significantly higher degree of control over the amount of land sprayed.

Avoiding channelization

In addition to bare spots, inspectors should be on the lookout for the early signs of channelization. Channelization occurs when flow is unevenly distributed within a strip and more water flows over a certain area than another (Figures 3 & 4).

This increased flow allows for faster water velocity and decreased residence time within the strip. It also leads to localized erosion and the development of channels. Channel development within a strip allows water to bypass large areas of treatment within the strip (Figure 4). Additionally, the channels deepen over time and make the problem worse.

Channelization can be avoided by reducing bare spots in the strip and avoiding traffic over the strip when the strip is wet or undergoing establishment. Any channels that are discovered should be filled in and reseeded as soon as possible.

Avoid contour planting

It is common practice today to make one pass of a planter around the edges of a field in order to fill any gaps in crop coverage (Figure 5). This eliminates the occasional bare spots that are the product of unequal “starting and stopping” points when utilizing a tractor-mounted planter.

Figure 3: Early channelization forming in a bare spot within a VFS. (Photo by B. Bodah)

Figure 4: Once channels form, erosion continues to worsen the problem. Here, entire areas of the strip remain dry and bare due to lack of water from channel formation. Tire tracks visible in the center of the photo likely contributed to initial channel formation. (Photo by B. Bodah)

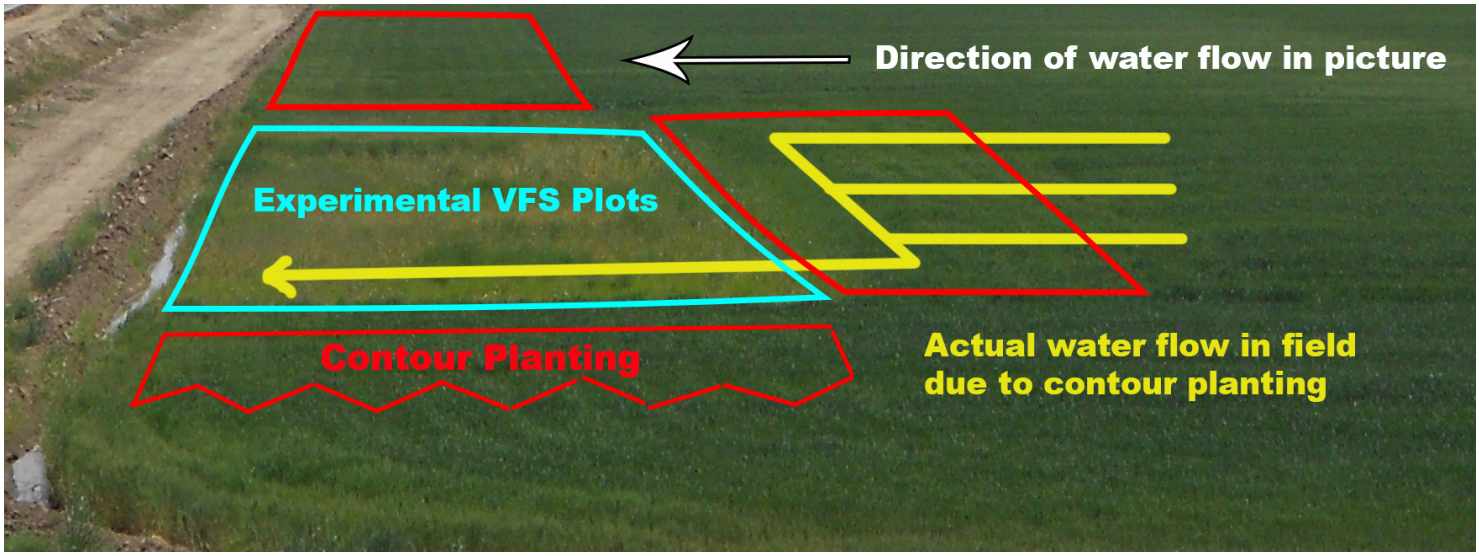

Figure 5: In this photo, contour planting surrounds a VFS test plot on a rill-irrigated field. Contour planting above a VFS destroys furrows and allows water to travel sideways through a field before entering the VFS. If the field is not level, certain areas of the VFS will be inundated while others will remain dry. (Photo by B. Bodah)

This one pass significantly impacts the furrow formation at the end of the field and allows for inter-furrow movement of irrigation water, leading to unequal water distribution at the end of the field. While this is a minor concern for row crops in furrow-irrigated agriculture, it can significantly impact the distribution of water within a VFS at the end of a field, flooding certain portions of the strip while leaving other slightly higher areas dry.

Figure 5 above shows that contour planting was performed directly upslope of the experimental VFS plot in this field. Contour planting should never be done directly upslope of a VFS. In order for VFSs to function as designed, intact, perpendicular furrows should extend directly to the VFS's edge.

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Know when to replant

The recommended lifespan for a VFS on the end of a rill-irrigated crop field is approximately five years. This is because vegetation density gradually decreases with time and a working VFS will continually collect suspended sediments as they filter surface water.

- Bunchiness—As a VFS ages, the density of the vegetation comprising the strip will eventually decrease and most vegetation will get bunchy or bushy (sometimes referred to as wolfy). Similar to channelization, such conditions allow water flowing through the strip to bypass large areas of treatment. Bare areas in-between vegetation bunches should be reseeded as soon as possible and strip reestablishment should be considered when a majority of the vegetation within the strip becomes bunchy. A bunchy strip is not an effective strip and should be replaced and replanted.
- Sedimentation—Over time, deposited sediments build up within a VFS, gradually reversing the gentle slope that allows for localized drainage and overcoming vegetation (Figure 6). This area will have to again be graded with a mechanized grader to reestablish the gradual slope for drainage purposes and to remove excess deposited soil and place it back on the working field.

Figure 6: Sediment deposition within a VFS. Photographer was standing at the end of crop and beginning of VFS. Water flow in picture is from bottom to top. (Photo by B. Bodah)

Adequate communication with farm hands

It is important to communicate to your hired workers that the newly created VFS is not to be plowed under or disked with the rest of the field. Ideally, the area is not to be driven on as well. A lot of hard work goes into establishing an effective VFS, and it should be utilized for more than one growing season. Keep in mind that effective communication is sometimes bilingual communication.

This document was adapted from:

Bodah, B.W. “Effective Suspended Sediment and Soluble Nutrient Load Mitigation in Irrigated Agricultural Return Flows Through the Use of Vegetative Filter Strips.” PhD diss., Washington State University, 2013.

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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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