Integrated Plant Protection Center
Katie Murray, Associate Professor of Practice
2040 Cordley Hall, Corvallis, Oregon 97331-2915
Tel: 541-231-1983
katie.murray@oregonstate.edu
ippc.oregonstate.edu

Elizabeth Hill
USDA Office of Pest Management Policy

Re: EPA consideration of pyrethroid mitigation measures; vegetative filter strips

July 10, 2019

The following comments are submitted in response to USDA OPMP's questions regarding mitigation measures for pyrethroids being considered by EPA. These comments are being submitted on behalf of the Western IPM Center, and provide input from Northwest commodities and university experts.

EPA is considering increasing the required vegetative filter strips (VFS) between fields where pyrethroids are used and water bodies from 10 feet to 25 feet. The proposed VFS could be reduced to 15 feet if:

- The area of application is considered prime farmland (as defined in 7 CFR § 657.5).
- Conservation tillage is being implemented on the area of application.
    - Conservation tillage is defined as any system that leaves at least 30% of the soil surface covered by residue after planting. Conservation tillage practices can include mulch-till, no-till, or strip-till.
- Terrace farming (such as defined here: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263187.pdf) is being used on the area of application.
- Water and sediment control basins are present, as defined here: https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcs143_026238&ext=pdf.

Question: Are these appropriate and effective practices that reduce the movement of soil into waterbodies? Are these practices well-defined so that growers will know what is being required without further definition? Are there other, similarly effective practices that EPA should consider adding to the list to maintain a 15-foot VFS instead of a 25 foot VFS? Are field borders, as defined here https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1241318.pdf, equivalent to a VFS?

Answer:

Field borders are not necessarily designed as vegetative filter strips. They can be designed to serve this same function, but they are not the same. A vegetated border or strip does not necessarily provide a quality filter, whether it is 10 feet or 40 feet.

Oregon State University
Integrated Plant Protection Center
Katie Murray, Associate Professor of Practice
2040 Cordley Hall, Corvallis, Oregon 97331-2915
Tel: 541-231-1983
katie.murray@oregonstate.edu
ippc.oregonstate.edu

It depends on slope, soil type, vegetation, preferential flowpaths (or whether a flow spreader is used to prevent preferential flowpaths) and width.

It was suggested that design guidance for a VFS is critical, and that NRCS has relevant guidance (enclosed). The NRCS guideline allows for adjustments in width based on local conditions. There are too many variables to say whether 25 feet or 15 feet would work without site-specific information.

There has been work a fair amount of research regarding the effectiveness of vegetative strips in terms of reducing runoff. Results vary depending on the design of the filter strip and the pesticide of concern. USDA NRCS recommends filter strips be at least 20 feet wide (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=nrcs142p2_044352). See enclosed example from a recent NOAA biological opinion with the various mitigation options proposed. The example cites effectiveness of different sized filter strips (5, 10, and 20 meters) based on a relatively recent review of the available literature. Also, see the following citation: Alix et al. 2017. Alix A, Brown C, Capri E, Goerlitz G, Golla B, Knauer K, Volker Laabs, Mackay N,Marchis A, Poulsen V, Prados EA, Reinert W, Streloke M. Mitigating the Risks of Plant Protection Products in the Environment: MAgPIE. ISBN:978-1-880611-99-9.

As pyrethroids occur in runoff primarily associated with suspended sediment, the USDA NRCS site-specific conservation practices planning process (which may include VFS) to reduce soil erosion makes the most sense, rather than the necessarily vague language on a statewide label. In addition, the cost of implementation may be a hard sell when there is little or no monitoring data for pyrethroids to support VFS/conservation practice effectiveness in reducing surface water loading.

Question: Is prime farmland generally considered to be at little risk from soil erosion?

Answer: Prime farmland may still have a slope and overland runoff in the winter. Although water is more likely to infiltrate on prime farmland, it is not guaranteed. It is unclear to experts consulted why EPA would propose a reduced buffer for prime farmland. Is there an objective definition for what is considered "prime farmland"? If not, this is a subjective term. It would be preferable to instead base filter strip width on specific soil type.

Oregon State University

Integrated Plant Protection Center
Katie Murray, Associate Professor of Practice
2040 Cordley Hall, Corvallis, Oregon 97331-2915
Tel: 541-231-1983
katie.murray@oregonstate.edu
ippc.oregonstate.edu

Question: EPA is also considering maintaining the current 10 foot wide VFS for Western irrigated agriculture (WA, OR, CA, ID, NV, UT, AZ, MT, WY, CO, NM). Is irrigated agriculture in these states at little risk for soil erosion?

Answer: Irrigated agriculture is just as much at risk for erosion as non-irrigated. In some cases, maybe more at risk due to runoff into streams at low flow when there is less dilution.

Relative to Western irrigated agriculture, wider buffers in continental climates (summer rainfall) makes sense. For continental climates, conditional buffer widths (15 ft instead of 25 ft) in conjunction with other conservation practices makes sense, but implementation of conservation practices to qualify for a reduced buffer (VFS) is not well defined. Labels are statewide, and conservation practices are site-specific, and this will be problematic.

In CA, OR, and WA, east of the Sierras and Cascades, and parts of the intermountain west, most pesticide runoff occurs in the spring and fall, and is generally associated with rainfall, not irrigation. In irrigated the west, pesticides applied in the late spring or summer must persist if they are to subject to runoff with the "fall flush". Furrow and flood irrigation that produces "return water" is the exception.

I would like to acknowledge the following individuals for the information presented here:

- Jeff Jenkins, Professor, Department of Environmental and Molecular Toxicology, Oregon State University
- Derek Godwin, Watershed Management Faculty, Professor, Biological and Ecological Engineering, Oregon State University
- Tony Hawkes, NOAA National Pesticide Team Member

Please let me know if you have questions or seek further information.

Respectfully,
Katie Murray

Katie Murray
Statewide IPM Coordinator
Integrated Plant Protection Center (IPPC)
Associate Professor of Practice
Department of Environmental and Molecular Toxicology

Integrated Plant Protection Center
Katie Murray, Associate Professor of Practice
2040 Cordley Hall, Corvallis, Oregon 97331-2915
Tel: 541-231-1983
katie.murray@oregonstate.edu
ippc.oregonstate.edu

Oregon State University
541-231-1983
katie.murray@oregonstate.edu

Katie Murray is Statewide IPM Coordinator for Oregon State University, and the Western IPM Center's Northwest IPM Network Coordinator. Katie has expertise in agricultural stakeholder engagement and consultation methods that include understanding current pesticide usage trends, and pesticide compatibility with IPM.

The IPPC is the hub for Oregon's statewide IPM program, and the main IPM resource in Oregon for farmers, researchers, and extension agents. The expertise represented in the IPPC is highly interdisciplinary and includes toxicology, entomology, horticulture, adult education, public health, and anthropology, all with an IPM focus. Within the IPPC, we have a collective expertise in understanding the use of pesticides within IPM programs with a goal of protecting the economic, environmental and human health interests of our stakeholders.

To compile comments, input is actively solicited from stakeholders throughout the Pacific Northwest in an effort to convey use patterns, benefits, potential impacts, and the availability and efficacy of alternatives. These comments largely reflect expert testimony from stakeholders, including research and extension experts as well as farmers and commodity groups. The comments do not imply endorsement by Oregon State University or the Western IPM Center.

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

FILTER STRIP

Code 393

(Ac)

DEFINITION

A strip or area of herbaceous vegetation that removes contaminants from overland flow.

PURPOSE

- Reduce suspended solids and associated contaminants in runoff and excessive sediment in surface waters.
- Reduce dissolved contaminant loadings in runoff.
- Reduce suspended solids and associated contaminants in irrigation tailwater and excessive sediment in surface waters.

CONDITIONS WHERE PRACTICE APPLIES

Filter strips are established where environmentally sensitive areas need to be protected from sediment, other suspended solids, and dissolved contaminants in runoff.

CRITERIA

General Criteria Applicable to All Purposes

Overland flow entering the filter strip will be uniform sheet flow.

Concentrated flow will be dispersed before it enters the filter strip.

The maximum gradient along the leading edge of filter strip will not exceed one-half of the up-and-down-hill slope percent, immediately upslope from the filter strip, up to a maximum of five percent.

Filter strips will not be used as a travel lane for equipment or livestock.

Additional Criteria to Reduce Dissolved Contaminants, Suspended Solids and Associated Contaminants in Runoff and Excessive Sediment in Surface Waters.

The filter strip will be designed to have a 10-year life span, following the procedure in Agronomy Technical Note No. 2, “Using Revised Universal Soil Loss Equation, Version 2 (RUSLE2) for the Design and Predicted Effectiveness of Vegetative Filter Strips (FVS) for Sediment,” based on the amount of sediment delivery to the upper edge of the filter strip and ratio of filter strip flow length to length of flow path from the contributing area. The minimum flow length through the filter strip will be 20 feet for suspended solids and associated contaminants in runoff and 30 feet for dissolved contaminants and pathogens in runoff.

The filter strip will be located immediately downslope from the source area of contaminants.

The drainage area immediately above the filter strip will have a slope of one percent or greater.

Vegetation. The filter strip will be established to permanent herbaceous vegetation.

Species selected will be—

- Able to withstand partial burial from sediment deposition.
- Tolerant of herbicides used on the area that contributes runoff to the filter strip.
- Stiff stemmed and a high stem density near the ground surface.
- Suited to current site conditions and intended uses.
- Able to achieve adequate density and vigor within an appropriate period to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Plant species, rates of seeding (lbs/ac), vegetative planting (plants/ac), minimum quality of planting stock (pure live seed [PLS] or stem caliper), and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Perform site preparation and seeding/planting at a time and in a manner that best ensures survival and growth of selected species. Successful establishment parameters, (e.g., minimum percent ground/canopy cover, percent survival, stand density) will be specified before application.

Schedule planting dates during periods when soil moisture is adequate for germination and establishment. Seeding will be timed so that tillage for adjacent crop does not damage the seeded filter strip.

Where the purpose is to remove phosphorus, remove (or harvest) the filter strip aboveground biomass at least once each year.

The minimum seeding and stem density will be equivalent to the seeding rate for a high quality grass hay seeding rate for the climate area or the density of vegetation selected in current water erosion technology to determine trapping efficiency, whichever is the higher seeding rate.

Additional Criteria to Reduce Suspended Solids and Associated Contaminants in Irrigation Tailwater and Excessive Sediment in Surface Waters.

Filter strip vegetation will be a small grain or other suitable annual plant.

The seeding rate shall be sufficient to ensure that the plant spacing does not exceed 4 inches (about 16–18 plants per square foot).

Establish filter strips prior to the irrigation season so that the vegetation is mature enough to filter sediment from the first irrigation.

CONSIDERATIONS

General Considerations.

Filter strip width (flow length) can be increased as necessary to accommodate harvest and maintenance equipment.

Filters strips with the leading edge on the contour will function better than those with a gradient along the leading edge.

Seeding rates that establish a higher stem density than the normal density for a high quality grass hay crop will be more effective in trapping and treating contaminants.

When needed, invasive plant species may be controlled through mowing, herbicides, and hand weeding.

Consideration for Reducing Suspended Solids and Associated Contaminants in Runoff. Increasing the width of the filter strip beyond the minimum required will increase the potential for capturing more contaminants in runoff.

Considerations for Creating, Restoring or Enhancing Herbaceous Habitat for Wildlife and Beneficial Insects and Pollinators. Filter strips are often the only break in the monotony of intensively-cropped areas. The wildlife and pollinator benefits of this herbaceous cover can be enhanced by the following:

- When appropriate, use native grass species that fulfill the purpose(s) of the practice while also providing habitat for priority wildlife.
- Adding herbaceous plant species (including native forbs) to the seeding mix that are beneficial to wildlife and pollinators and are compatible for one of the listed purposes. Changing the seeding mix should not detract from the purpose for which the filter strip is established.
- Increasing the width beyond the minimum required. The additional area can increase food and cover for wildlife and pollinators.
- Management activities on filter strips (mowing, burning, or light disking), should not be done more often than every other year with frequency dependent on geographical location to maintain the purpose(s) of the practice.
- Management activities should be completed outside of the primary nesting, fawning, and calving seasons. Activities should be timed to allow for regrowth before the growing season ends.
- Organic producers should submit plans and specifications to their certifying agent for approval prior to installation, as part of the organic producer’s organic system plan.

Considerations to Maintain or Enhance Watershed Functions and Values. Filter strips may be used to enhance connectivity of corridors and noncultivated patches of vegetation within the watershed, enhance the aesthetics of a watershed, and be strategically located to reduce runoff, and increase infiltration and groundwater recharge throughout the watershed.

Increase Carbon Storage. Increasing the width of the filter strip beyond the minimum required will increase potential for carbon sequestration.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice will be prepared for each field or treatment unit. Record the specifications using the implementation requirements document. The specifications will identify at a minimum the following:

- Practice purpose(s).
- Length, width (width refers to flow length through the filter strip), and slope of the filter strip to accomplish the planned purpose(s).
- Plant species selection and seeding/planting/sprigging rates to accomplish the planned purpose.
- Planting dates and planting method(s).
- Specific care and handling requirements of the seed or plant material to ensure that planted materials have an acceptable rate of survival.
- A statement that only viable, high quality, and adapted seed will be used.
- Site preparation instructions sufficient to establish and grow selected species.

OPERATION AND MAINTENANCE

For the purposes of filtering contaminants and nutrients (phosphorus), permanent filter strip vegetative plantings will be harvested and removed as appropriate to encourage dense growth, maintain an upright growth habit and remove nutrients and other contaminants that are contained in the plant tissue.

Control undesired weed species, especially State-listed noxious weeds.

If Conservation Practice Standard (CPS) Prescribed Burning (Code 338) is used to manage and maintain the filter strip, an approved burn plan must be developed.

Inspect the filter strip after storm events and repair any gullies that have formed, remove unevenly deposited sediment accumulation that will disrupt sheet flow, reseed disturbed areas and take other measures to prevent concentrated flow through the filter strip.

Apply supplemental nutrients as needed to maintain the desired species composition and stand density.

Periodically regrade and reestablish the filter strip area when sediment deposition at the filter strip-field interface jeopardizes its function. Reestablish the filter strip vegetation in regraded areas, if needed.

If grazing is used to harvest vegetation from the filter strip, the grazing plan must ensure that the integrity and function of the filter strip is not adversely affected.

REFERENCES

Dillaha, T.A., J.H. Sherrard, and D. Lee. 1986. Long-Term Effectiveness and Maintenance of Vegetative Filter Strips. VPI-VWRRC Bulletin 153.

Dillaha, T.A., and J.C. Hayes. 1991. A Procedure for the Design of Vegetative Filter Strips: Final Report Prepared for U.S. Soil Conservation Service.

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (In Draft). USDA-ARS, Washington, DC. 2005.

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture. Agriculture Handbook 703.

Revised Universal Soil Loss Equation Version 2 (RUSLE2) Web site (checked May 2007): http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm.

M.G. Dosskey, M.J. Helmers, and D.E. Eisenhauer 2008. A Design Aid for Determining Width of Filter Strips. Journal of Soil and Water Conservation. July/Aug 2008—vol. 63, no. 4.

Table 2. Chlorpyrifos Risk Reduction Measures and Associated Points

Drift Measures	Estimated % reduction in loading	Points	Runoff/drainage Measures	Estimated % reduction in loading	Points
No Spray Drift Buffers : Ground boom[1] /chemigation buffer: 10 meters 20 meters 100 meters 200 meters 300 meters Air blast buffer[2]: 20 meters 100 meters Aerial buffer[3]: 100 meters 300 meters	25 60 90 95 99 40 99 60 99	5 40 70 75 80 20 80 40 80	No Spray Buffer ≥300 meters to listed species habitat or water that drains to habitat	99	80
Spray Drift Reduction Technology[4] (nozzles, etc.): Category one Category two Category three Category four	25-50 50-75 75-90 >90	20 45 65 75	Vegetated filter strip[5]: 5 meters 10 meters 20 meters Inter row	40 65 80 50	20 45 60 30
Granular treatment	99	80	Bunds[5]: Edge of field In-field	40 50	20 30
Spot Applications <0.1 A[6]	99	80	Spot Applications <0.1A[6]	99	80
			Vegetated ditches[5]	50	30
Riparian plantings[7]	27-36	10	No-till or reduced tillage[5]	50	30
			Retention pond[5]	75	55
Participation in recognized stewardship program	99	80	Participation in recognized stewardship program	99	80
Functional riparian system alongside water ways, > 10 meters wide	99	80	Functional riparian system alongside water ways, > 10 meters wide	99	80

[1] *AgDrift Tier 1 Ground Boom – point deposition estimates compared to 25 foot ground application buffer: low boom, very fine to fine distribution, 50th percentile distribution.*
[2] *AgDrift Tier 1 Orchard Airblast - point deposition estimates for sparse orchard compared to 50 foot airblast application buffer.*
[3] *AgDrift Tier 1 Aerial – point deposition estimates compared to 150 foot aerial application buffer.*
[4] *EPA may have not verified any products yet (https://www.epa.gov/reducing-pesticide-drift/epa-verified-and-rated-drift-reduction-technologies).*
[5] *MAgPIE. 2017*
[6] *Assumes median field size of 0.278 km^2 (Yan and Roy 2016)*
[7] *Washington State Department of Agriculture riparian vegetation pilot study (2015)*