Bio-Beds

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Swift Current Creek Watershed Stewards

Know Your Watershed

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Two Stage Bio-Bed

Using Bio-Beds to Manage Pesticide Rinsate.

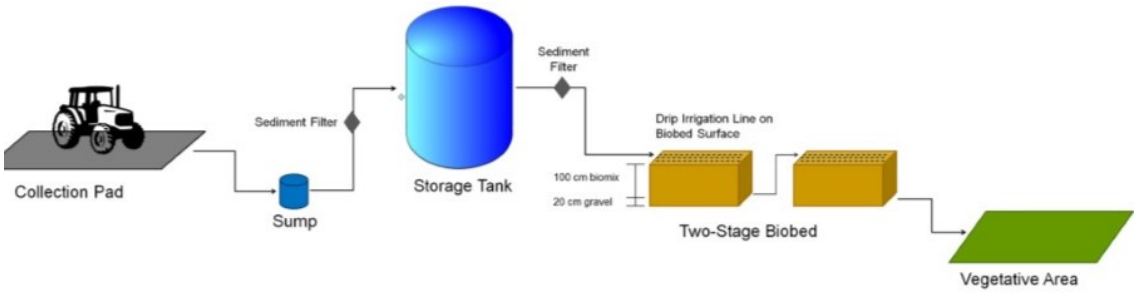
The responsible application of pesticides is an important part of many crop operations in Southwest Saskatchewan. Farmers, retailers and pesticide manufactures have taken many steps to reduce the possibility of pesticides negatively impacting water quality, but there are still concerns that pesticides are present in source water. A significant source of pesticide contamination in source water can originate from the area where the sprayer is filled, rinsed and washed. This area is often close to a water source, has little or no topsoil and receives high amounts of sprayer rinsate which is often more concentrated than what is sprayed on fields and crops. All of these factors can increase the amount of pesticides in the soil where the rinsate is disposed of which increases the chances of pesticides running into surface water and seeping into groundwater especially if rinsing area is near a working or abandoned water well.

This winter is a good time to start planning how you are going to handle pesticide rinsate during next year's growing system. One way to minimize the risk of contaminating ground and surface water is the use of a Pesticide Rinsate Bio-bed. A Bio-Bed is a container or containers filled with a mixture of woodchips or straw, soil and compost (bio-mix). Next to the Bio-Bed is an area to fill and rinse your sprayer, a sump to collect rinsate and a holding tank. The rinsate will drain into a sump and then pumped into a holding tank. A low daily volume of water from the holding tank is trickled or sprayed over the top of the bio-bed, this water evaporates or runs through the bio mix. Once it works its way through the bio-mix the treated water can then be used to irrigate grass or tree rows.

Pesticide molecules adhere to the natural occurring bacteria in the soil of the

Pesticide molecules adhere to the natural occurring bacteria in the soil of the bio-mix that breakdown pesticide residues. Soil from a field that has been exposed to a number of commonly used pesticides will give you the best results as it contains microbes that use pesticides as a food source enhancing the degradation of the pesticide in the rinsate. As the rinsate works its way through the bio-mix chemical molecules are removed from the rinsate water and then degraded, leaving treated water to flow out of the bio-mix container to irrigate grass or tree rows.

The bio-bed can treat herbicides, insecticides and fungicides. Fungicides may affect the fungi in the Bio-bed but will they usually recover in a month after exposure. If you use a large amount of fungicides in your operation then a two stage Bio-bed should be used. Rinsate should always go through the sump and holding tank system as the microbes present in the bio mix may not be present in large enough numbers or have enough diversity to degrade the high concentrations of pesticide directly applied to the bio-mix.



Schematic Diagram of a Two-Stage Bio-Bed

The bio-bed should be on a high flat piece of land with some slope to allow the area where the sprayer is filled and rinsed to drain to the sump. The area should have a water diversion system around it to keep run-off from entering the sump and overloading the storage system. The bio-bed can be close to existing chemical handling areas to use existing water and electrical supplies. However if this is close to a water source then both the handling area and the bio-bed need to moved to a new location away from this water source. The area where the sprayer is filled and rinsed needs to be big enough to collect all

of the rinsate of your sprayer and needs to be able to handle the weight of the sprayer. You will need a storage tank big enough to hold at least a third of the expected yearly volume of rinsate.

The best bio mix contains 50% straw or wood-chips, with straw being easier to source in southwest Saskatchewan. There is also 25% topsoil that has been exposed to pesticides in the mix. The best soil is organic rich loam as too much clay will reduce water movement in the Bio-Bed and too much sand reduces the capacity to accommodate microorganisms. The last 25% of the mix is vegetation based peat/compost. Manure based compost has not been used in bio-beds and its efficiency has not been established. Before using, this mix should stand for 2 months with water added periodically to keep it moist. To ensure that the microbes in the bio mix are ready to start degrading pesticides during the spring burn off season a heating coil may need to be included in the Bio-bed to accelerate thawing in the spring.
More information on the construction, operation and maintenance of a bio-bed can be found in “A robust Biobed design for managing pesticide rinsate under Canadian conditions” by Braul L., Reddyk, S and Shedy, C. 2018 Agriculture and Agri-Food Canada, Regina, Saskatchewan, Canada.

The cost of a Biobed varies between $6,000 to $23,000 based on the amount of rinsate that needs to be treated, the size of the rinsing area and Bio-Bed treatment container and materials used for the collection pad and bio-bed. This may seem expensive but it is money well spent compared to developing new water sources should existing ones become contaminated with pesticide residue. For more information on Biobeds please contact the Swift Current Creek Watershed Stewards or look for “A robust Biobed design for managing pesticide rinsate under Canadian conditions” by Braul L., Reddyk, S and Shedy, C. 2018 Agriculture and Agri-Food Canada, Regina, Saskatchewan, Canada at publications.gc.ca.

Solar powered water bowl to water livestock away from source water
One of many Beneficial Management Practices availble to producers through the different Agri-Environmental Funding Programs that SCCWS has been a part of

Agri-Environmental Services offered in the Swift Current Creek Watershed for Canadian Agricultural Partnership Funding

Producers in the Southwest have improved the sustainability of their operation and improved water quality and watershed health by implementing beneficial management practices (BMP's) under the Farm Stewardship and Farm and Ranch Water Infrastructure Programs. For almost 15 years SCCWS and our Agri-Environmental Technicians have worked alongside producers to implement these practices and promote environmental stewardship to agriculture producers.

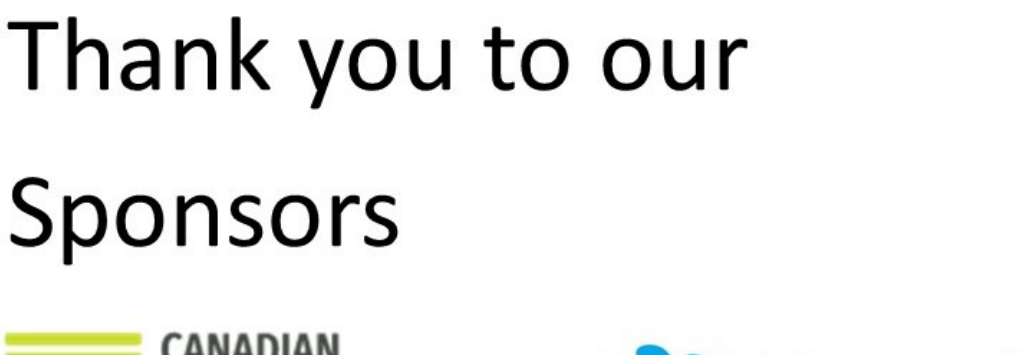
SCCWS's Agri-Environmental Technical Service (AETS) technician Dallas Peters is contracted by the Ministry of Agriculture (MOA) to assist producers with both Farm Stewardship and Farm and Ranch Water Infrastructure applications to ensure they are meeting all requirements and obtaining all the necessary paperwork to have projects approved. As MOA contracts Dallas through SCCWS all of her work required to apply for projects is free of charge for producers.

Working with Dallas ensures that your project meets eligibility requirements

Working with Dallas ensures that your project meets eligibility requirements before it is submitted, reducing surprise requests for missing or additional information. This will speed up the approval process, allowing you to start your project sooner and get payments in a timely manner. Many projects will require pre-approval documents, which Dallas can help you complete. An example of this is the Program Native Rangeland Management BMP which requires pre-approval before work can start on the project. Before the project can be approved a native rangeland health assessment and grazing plan for your operation must be completed. Dallas will do the assessment and work with you to complete a grazing plan and the assist you with the completion of the paperwork to apply for the project funding.

SCCWS can also assist you in obtaining any permits, approvals, or permissions that may be required depending on the type of project. Dallas has a network of contacts and experience with completing all of the forms, permits, plans and assessments required for all BMP's. This will speed up the application process, including obtaining any necessary permits and reducing questions about the projects from reviewers at MOA.

In the Swift Current Creek Watershed Agri-Environmental area there are 15 RM's that SCCWS provides service to: Arlington, Big Stick, Bone Creek, Carmichael, Coulee, Excelsior, Gull Lake, Lac Pelletier, Maple Creek, Morse, Piapot, Pittville, Saskatchewan Landing, Swift Current, and Webb. For more information on specific Beneficial Management Practices funded under CAP call the Ag knowledge Centre at 1-866-457-2377 or your regional Ministry of Agriculture office. Once you have a specific project in mind that could be funded under the CAP Program contact Dallas Peters at SCCWS at 306-770-4606 or dallas.sccws@gmail.com and she will assist you with all of the assessments, permits and paperwork necessary to complete the requirements to receive funding for the completion of your project.



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