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VIDEO: Ag Canada researchers focus on biobeds

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Prairie farmers will have more opportunities to see and learn about biobeds this year as the Agriculture Canada Biobed Working Group builds more of them and shares information on research findings from studies conducted over the past several years. | Barb Glen photo

Rinse water from sprayers can be applied to a biobed, where the residual chemicals are digested by bacteria and fungi



The biobed recipe for handling pesticide rinsate is surprisingly simple: take soil from your fields, mix it with straw, woodchips or peat moss, put it in a large open bin or bed, add sprayer rinse water collected in a holding tank, and wait.

That's the process at its most basic, although a dual bin or bed system can be even better at removing pesticides from sprayer rinse water. And there's a manual that tells all about it.

Prairie farmers will have more opportunities to see and learn about biobeds this year as the Agriculture Canada Biobed Working Group builds more of them and shares information on research findings from studies conducted over the past several years. Some applied research groups also plan to build and use them as demonstration projects.

"It's one of my favourite projects because it's a solution that I think our growers definitely need," said biobed group lead Claudia Sheedy of Agriculture Canada in Lethbridge.

Rinse water from sprayers used for crop treatment can contaminate groundwater. Applied to a biobed, the residual chemicals in the rinsate can be digested by bacteria and fungi.

"If we were to add up all of the different pesticides that we load onto the biobed, and the total mass applied to the biobed, 90 percent of that mass is actually removed from the biobeds," said Sheedy.

"And if you use a double system that we recommend for the Prairies' farming operations, we remove 98 percent of that mass. So its pretty efficient, actually."

A double system involves two beds: effluent collected from the bottom of the first bed is applied to a second bed, allowing for further breakdown of any remaining pesticides.

Sheedy has been studying biobeds since 2012. Her research and that of colleagues elsewhere on the Prairies has provided some unexpected results.

“I think the biggest surprise was how efficient the biobeds are, with the variety of chemicals that we’re looking at,” she said about Agriculture Canada’s study sites.

“We looked at the bacterial communities in those five biobeds on the Prairies, and what we realized is that every single biobed, no matter how many pesticides it received or when it was built, they all had microbial communities growing pretty fast once pesticides were applied. The more pesticides in terms of volume, the more you apply, the better the bacteria were thriving.”

Agriculture Canada has a manual for the construction and operation of biobeds. The timing is opportune because farmers can apply for funding through the Canadian Agricultural Partnership to cover most or all costs associated with establishing a site.

Sheedy estimates the cost at \$8,000 to \$10,000, depending on whether there’s a pesticide handling area already in place and whether there is access to electricity. The latter will be needed for pumps and potentially for heating the bed in early spring and late fall so that it continues to function during colder pre-seeding and post-harvest periods.

Once operational, maintenance involves topping up the bed annually with soil and wood chips or straw to account for settling. Though biobed longevity continues to be studied, Sheedy said they should last seven to 10 years. At that point, the biomixture should be composted for a year and a fresh mixture put into use.

“We always use local topsoil because typically that soil has already been exposed to the pesticides used in the area, so the bacteria and the fungal communities that can thrive under those conditions are already present,” she said.

“So we want to use that and amplify those communities within the biobed.”

The depth of the material is less important than the total surface area. The main limitation is volume. Too much rinsate added too fast will reduce effectiveness because the soil microorganisms need time to degrade the pesticides carried in the water.

Researchers have tested more than 200 herbicides, insecticides and fungicides, and most are fully degraded within an active biobed. Two herbicides, clopyralid and imazethapyr, do not degrade as well as most other chemicals tested, said Sheedy.

She is hopeful that prairie farmers will embrace the use of biobeds, which have been successfully used in Europe for years.

Tom Wolf of Saskatoon-based Agrimetrix was the first scientist to promote biobed use on the Prairies, said Sheedy. He helped generate awareness of the concept and pique the interest of commodity and applied research working groups.

“I think it’s just a matter of time before it gets adopted,” said Sheedy.

“We’re working hard with them, to convince them and to support them too with the knowledge and the science that they need to get it done.

“I don’t see any reason why our growers wouldn’t find them appealing, just like European growers. It’s good for growers. It’s good for the environment. It’s good for the industry in general.”

Farming Smarter, southern Alberta’s applied crop research group, plans to build a biobed on its site this year and also build a mobile unit that can be taken on the road as a demonstrator.

“Because we are in research, it makes a lot of sense,” said Farming Smarter general manager Ken Coles.

“We do have probably as much rinsate or more than a farmer would. So to demonstrate it, for us it’s two-fold. It’s helping us do a better job but also now we’ll have it on site to be able to show all the people that we bring on tours.”

A biobed built on a trailer will allow the group to share it across counties and show farmers what is involved. They might be surprised at its simplicity, said Coles.

“I was surprised myself. That’s it? A bucket of dirt and straw? But I think it’s a fantastic social licence story as well, to prove to the public that we’re doing as much as we can to use our product in a safe and responsible manner.”

Sheedy also sees the concept and resulting research as good news for farmers and researchers.

“It’s really nice for a pesticide chemist like me to work on solutions rather than on finding problems in the environment.”

The Agriculture Canada manual on biobeds, [A Robust Biobed Design for Managing Pesticide Rinsate Under Canadian Conditions](#).