

Potash may be irrigators' best weapon against invasive mussels

by Tim Kalinowski

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According to AAF water quality researcher Brad Calder, zebra mussels, and their close cousin quagga mussels, are an imminent threat to southern Alberta's irrigation districts.

"Alberta really is irrigation," said Calder. "We have \$7 billion invested in the infrastructure. It includes 57 reservoirs, about 4,000 km of canals and pipelines and other specialized structures such as pumping stations.

"Many kilometres of that infrastructure could be impacted by those mussels. The veligers are the juvenile forms of mussels, and it is important to note they are microscopic. So you can bring water into the province on your boat and not even know it."

While no confirmed instances of mussel infestation have been reported in Alberta's waterways yet, Calder feels it is only a matter of time. He and his fellow researchers are determined to use the time they have between then and now wisely, to find an affordable means to control or outright eliminate these mussels in irrigation zones before any such infestation gains traction.

"We are currently looking into counter-control options to treat the irrigation pipelines," confirmed Calder. "To treat those pipelines isn't simple because thermal vibration treatments won't work. Pipelines' coatings will take a long time to re-coat all that existing infrastructure; pipeline pigging isn't necessarily an option because the irrigation pipelines reduce in size the closer they get to farms.

"It is also important to note there is no chemical approved for use in Canada for invasive mussels. So we are working with Alberta Environment and Parks to explore potash as an option."

Field trials to inject liquid potash into irrigation pipelines have been carried out the past two years. On a smaller scale in 2016 and a slightly larger one in 2017.

"Our field trial methods involved the concentrated injection of that potassium chloride solution, which we developed by mixing powdered potash with pond water. It was filtered into a clear solution. We then injected it by a dosage pump into the vertical feeder pipe of these underground pipelines. To inject at the proper rate we had to monitor the flow rate moving into that pipeline as the pivots were operating."

Calder said a concentration of about 100 mg of potassium solution per litre of water was the target he and his fellow researchers were going for. They easily achieved this result in 2016 using three pivots in the Eastern Irrigation District and about 4,000 metres of pipeline.

"(The potash) works on mussels as a anesthetic which prevents them from completing respiration," Calder explained.

"It's naturally occurring and it's available right next door in Saskatchewan."

In its 2017 trials they conducted several more experiments on two other separate trials in co-operation with the Tabor Irrigation District and St. Mary River Irrigation District. This time encompassing eight and seven pivots respectively and 7,000 metres of pipeline in both locations. Again the research team was able to hold the target rate of 100 mg/ litre over longer period of time of 24-48 hours.

At the end of the day, Calder felt potash was definitely a viable treatment option for pipelines, but the research couldn't hold any promises for reservoirs or canals for effective mussel treatment.

"Potash at this time seems relatively inexpensive compared to other options such as oxidizers," explained Calder, "but we are not sure reservoirs and canal treatments would be cost effective."

When asked by an audience how treatment with potash might work, Calder said it could be unleashed into pipelines just as the mussels were getting set to release their veligers.

"There are two reproductive events per year with these invasive mussels," he said. "They will release their sexual gametes and then form juvenile mussels which will settle out. So possibly treatment once per year would work."