

New technology helps farmers to remove nitrates from drainage

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Water sampling taking place on a farm to test nitrate levels. Credit: Massey University

Massey University scientists unveiled a prototype of their novel systems for stripping nitrate from farm drainage at this year's Fieldays, capturing

hundreds of people's attention including farmers of all ages, members of the public and Prime Minister Jacinda Ardern.

Associate Professor in Environmental Hydrology and Soil Science Dr. Ranvir Singh and Associate Professor in Soil Science Dr. David Horne have been working on this project since 2018 and were excited to share the next step with the public.

The project involves working with local farmers to develop innovative [drainage](#) management practices to reduce [nitrate](#) losses from agricultural lands to waterways.

Project co-lead Dr. Singh says artificial drainage systems provide an important function in poorly drained or very shallow groundwater areas. Drainage is beneficial in removing excessive soil wetness to support [plant growth](#), grazing and field operations, but if not managed properly can lead to losses of nitrate from soils to waterways.

"Controlled drainage and woodchip bioreactors are cost-effective techniques to reduce nitrate in drainage waters; they don't negatively affect drainage, are cheap to build, and require very little maintenance over their long life.

What we learn from this prototype is how these systems can be applied elsewhere."

How does it work?

Woodchip bioreactors work in much the same way as wastewater treatment plants but for nitrate in drainage waters. As [water](#) from the drain is released into the bioreactor, the woodchips absorb the nitrogen and nitrogen-free water flows out.

Project co-lead Dr. Horne says nutrient management and limiting the impacts on water quality are critical issues in agriculture and horticulture in New Zealand.

"If we can help farmers reduce the impact of their farms on surface [water quality](#) and help conserve drainage waters for use as irrigation, we can reduce the demand on ground and surface water sources, while improving their quality.

"This technology has not been trialed in New Zealand much before this [project](#) and it's important we see how it can be applied and integrated into our agriculture systems here."

Trials overseas in the US, Ireland and Denmark are different says Dr. Horne as they have more arable systems and New Zealand has more open grazing.

"Nitrate is still a problem in all these places and the issues surrounding it are similar, so we do share and exchange knowledge globally."

There have been on farm trials of the controlled drainage and woodchip-technology in Manawatū, but Dr. Singh says bringing the research to Fielddays and sharing their findings so far helps to maintain momentum.

Provided by Massey University

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