INNOVATIVE DRAINAGE MANAGEMENT TECHNOLOGIES

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The sandy soils of the coastal Manawatu region are used for dairying, vegetable production, cropping and other intensive landuses. The favourable climate, coarse texture of these soils and use of irrigation result in highly productive farm systems which often have relatively large nitrogen leaching losses. The coarse nature of the soil and the use of irrigation mean that low cost mitigation practices tend to be less effective, and so more expensive ameliorative measures need to be employed to significantly reduce nitrogen leaching.

The position of these soils in the landscape and their proximity to sea level means that artificial surface drainage is often required to maintain groundwater levels below the root zone, particularly during the wet season. However, this drainage network provide a shortcut that sees excess water travel very quickly from the soil profile to the receiving stream, spending little time moving as groundwater. Therefore, there is limited opportunity for subsurface denitrification to occur and so drainage that is delivered to streams via the drain network often has a high nitrogen load.

A way to ensure that the nitrate-N attenuation capacity of groundwater is realised without compromising the important function of the artificial drainage system is required. This project designs and evaluates new 'edge of paddock' technologies to reduce nitrogen leaching losses from farm production systems, and increase water availability for irrigation in a cost-effective manner. This can be achieved by managing or controlling the water table height or drainage rate in the surface drain. Controlling drainage allows for short periods of rapid discharge of surplus water when required and longer periods where drainage is not needed. Controlled drainage increases the residence or travel time of surplus water as it moves along the water table to the drain and the opportunity for denitrification of nitrate-N. On the occasions that a lower water table is required, the drainage water can be routed through a wood-chip bioreactor to reduce the nitrate-N flux in these waters.

The ability of Controlled drainage in conjunction with bioreactors to reduce nitrogen leaching is being studied in the coastal Manawatu. This project will help farmers reduce the impact of their farms on surface water quality and help them conserve drainage waters for use as irrigation thereby reducing the demand on ground and surface water sources.

Editor's Note: An extended manuscript has not been submitted for this presentation.