

An investigation into the efficacy of cover crops in reducing agriculturally derived groundwater nitrate.

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ChaMP for Water (Brighton **Ch**alk **M**anagement **P**artnership) has been trialling the use of cover crops over winter 2017-2018 in the Brighton area. Instead of leaving fields bare, crops are planted which take up excess nitrates remaining in the soil after the previous crop, reducing losses to the aquifer. These cover crops are beneficial to soil health and erosion protection, and some can be used as a fodder crop. We monitored the soil water below the root zone to assess nitrates losses. Well attended farmer events and regional TV coverage helped to promote the cover crop trial, and we are now offering this option to farmers as part of our rural incentive scheme.

The results of this study have shown that between October 2017 and March 2018 at Housedean and Mile Oak Farms respectively, the use of cover crops of all varieties significantly reduced the leaching of nitrate to groundwater compared with soil with no green cover. At the Housedean and Mile Oak sites the most effective over winter cover crops were Complex EFA and Multi Mix respectively reducing median concentrations of nitrate by approximately 99%.

Although no direct comparison is available for the Complex EFA and Long Cover mixes, comparison of the results for the other seed recipes to the control plots strongly suggest that the clayey soil texture at Mile Oak and the slightly more freely draining soil at Housedean play an important role in the leaching of nitrate when other parameters are identical (cover crop recipes) or very similar (mean rainfall and soil temperature). For example, median values for the control plots of 71.95 mg/l at Housedean and 58.95 mg/l at Mile Oak indicate that the Housedean site has a higher tendency to leaching even though the cover crops were planted earlier than Mile Oak, giving them longer to establish, although the different soil textures may be more or less suited to different cover crop mixes explaining the differing levels of efficiency at each site.

Concerns raised over the potential risk of increased numbers of pests due to over-winter green cover were also shown to be unfounded by the results of the associated slug survey. This found that slug activity was affected more by climatic factors such as temperature and humidity than by the planting of over-winter green cover. Indeed, by the end of the survey, it was found that the majority of slugs over the duration of the study were found in the control plot, which was devoid of any green cover, where slug numbers were greater than all the other plots combined. However, the relatively high slug numbers found in the plots comprising the Grazing and Multi mixes at Mile Oak, where some naturally occurring grasses and other volunteers were present, suggest that slugs are attracted to slightly weedy fields or weedy plant species.

This, according to several studies, may actually limit any damage to the required crop by providing an alternative food source for the slugs. Therefore, any concerns over issues of pollution swapping are effectively cancelled as metaldehyde pollution will not increase for the sake of nitrate reduction.

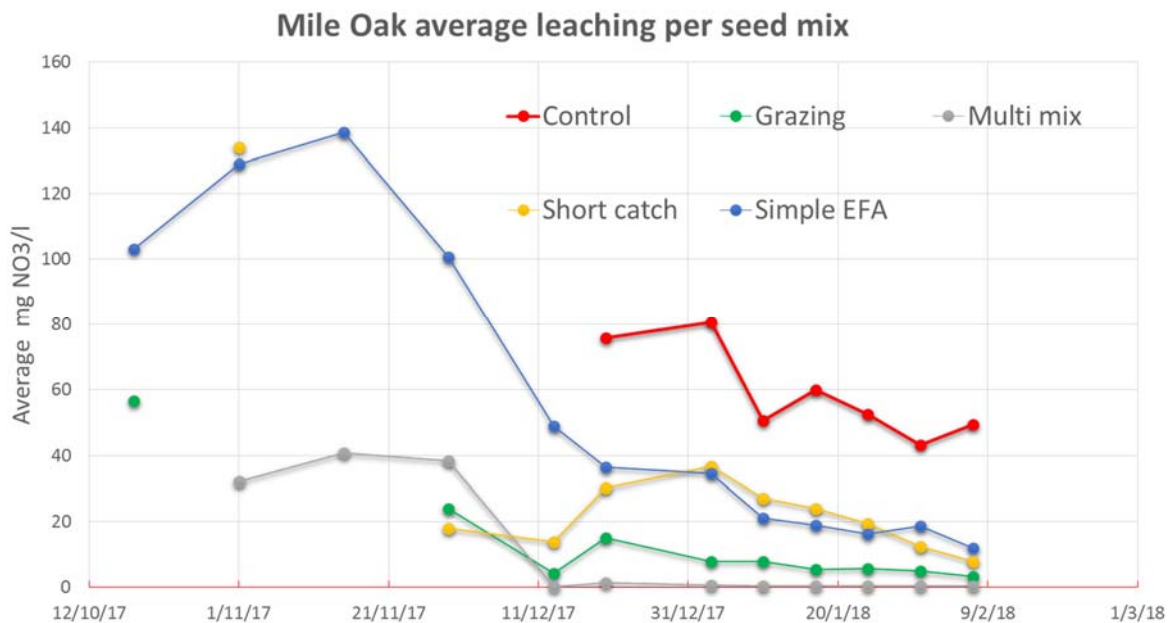


Figure 1. The best performing cover crop reduced nitrate leaching by an average of 82% across the season

About Brighton ChaMP (Chalk Management Partnership) for Water

Brighton ChaMP for Water was designed in response to rising nitrate trends observed at Southern Water abstraction boreholes in the Brighton Chalk Block. The principal aim of the project is to protect and improve the quality of groundwater in the Brighton Chalk, to ensure it remains a sustainable resource for public water supply.

To achieve this, actions identified and agreed collaboratively in the Environment Agency’s Safeguard Zone (SGZ) action plans, the South East River Basin Management Plan, Southern Water’s Water Resources Management Plan (Draft) and National Environment Programme; and the Adur and Ouse Catchment Plan (groundwater chapter) will be prioritised and delivered. This puts into practice the concept of integrated catchment management. We work together on engagement and consensus building, to influence behaviour and agree specific mitigation/ intervention measures to be put in place.

ChaMP comprises the Environment Agency, Southern Water, the South Downs National Park Authority, Brighton & Hove City Council and the University of Brighton, working together with Natural England and the Brighton and Lewes Downs Biosphere (The Living Coast).

High nitrates in groundwater are a longstanding problem. There is a general rising trend combined with seasonal peaks during autumn/winter when higher rainfall flushes excess nitrates through soil and into groundwater. Within the Brighton Chalk block 7 of the 13 Southern Water abstraction boreholes have reached the Drinking Water Inspectorate threshold at some point. This requires additional treatment, blending of sources or taking a borehole out of production. The increasing nitrate burden and associated cost of treatment is putting some sources at risk, potentially jeopardising long term sustainable water supply. Catchment schemes to deliver reductions in nitrate leaching into the environment are therefore essential.

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