

FRST Land Use Change & Intensification II (LUCI II) programme – Plant & Food Research & AgResearch.

The goals of this eight year Plant and Food and AgResearch programme are to provide “the integrated knowledge and tools required by land users and policy makers to assess and better manage impacts associated with land use change and intensification on agricultural productivity and the environment”.

The major achievements of the programme during the first year include the development of new knowledge from our field and laboratory experiments and the incorporation of this knowledge into paddock- and farm-scale models and decision support tools that are already being used by end-users in a number of different ways.

Some of the results of the research team’s close working with industry and policy sectors include: 1) the use of the LUCI paddock scale models to predict the environmental impacts of land use and management change that is informing regional and central government policy development, 2) the use of new and improved crop calculators (e.g. the Potato Calculator) by farmers and industry groups to optimise the economic performance of crop management systems, and 3) use of the Land Management Index (LMI) decision support tool and recommended best management practices to help maintain soil quality and improve the performance of agricultural production systems. The LUCI programme also led to the development of AmaizeN-lite, a model designed for easy use by farmers to improve N management of maize crops. Through this transfer of information farmers are better able to apply this knowledge to improve the economic performance of intensively managed land and reduce the environmental impacts associated with changes and intensification in land use.

The applications of these tools and management practices, including those developed in the precursor LUCI programme, are already creating economic benefits for the agricultural sector. The longer-term economic benefits include an estimated ongoing savings of about \$12 million pa in N fertiliser costs resulting from use of the Sirius Wheat Calculator. The arable industry estimates that 70-80% of NZ’s wheat-growing area has been influenced by management recommendations from this calculator. Similar levels of economic benefit have been reported as likely outcomes from the use of the maize and potato calculators. The LMI is an important tool for the dissemination of soil and crop best management practices. We estimate our research has led to an increased uptake of reduced tillage practices that are producing a direct economic benefit of \$4-5 m pa in reduced production costs and up to \$10 m pa from increased crop yields. The LMI model continues to be recognised in the regional plans of several Regional Councils (e.g. Environment Canterbury and Environment Waikato) as an important tool for monitoring and managing the impacts of land use change. Future direct economic benefits due to improved irrigation practices developed in association with this programme is estimated at up to \$100 m pa for dairy land in Canterbury and up to \$30 m pa for potatoes.

Beyond the highly productive collaboration amongst key IRAP member organisations we have established a new international collaboration with Dr Jeff Baldock (CSIRO Land and Water, Adelaide) to improve our ability to predict mineralisation of N from soil organic matter. This will help us predict the supply of soil N in response to management changes, including land use intensification. In a collaboration with Landcare Research, good progress has been made in categorising key regional soil types to be used in conjunction with paddock and farm scale models, including decisions support tools.

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