



Trials prove carbon reduction with CRFs

Written by

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Farmers can slash their fertilizer use and their carbon footprint without impacting yields – and could even command a premium for their crops, according to new research. The trials revealed that controlled release fertilizers (CRFs) significantly reduce emissions, by up to 25.8%, cutting nutrient losses and improving nutrient use efficiencies (NUE).

“The world faces a dual challenge,” says Georg Lempert, global sustainability partnerships manager at ICL Growing Solutions. “We need to feed a growing world population, while at the same time cutting greenhouse gas emissions. Agriculture is at the heart of the problem and the solution.

“We believe that it's time to rethink how sustainability and profitability can work together,” he adds. “It all starts with smarter inputs. ICL's eqo.x CRF technology is designed to reduce nitrogen inputs while still maximising yields. It's easy to use, it's precise, and it's the first step of building a low carbon food chain.”

The pilot study was held over 31.12ha on three potato farms in Flevoland and Zuid-Holland in the Netherlands, producing both table potatoes and processing varieties for French fries. The primary aim was to obtain more experience in quantifying and certifying CO₂ reduction within a farm setup. The farmers were given the choice of maintaining fertilizer use

and boosting yields, or cutting inputs while maintaining yields. In each case they opted for the former – but still benefited from a lower carbon footprint.

Creating incentives

The results revealed that producers could reduce their carbon footprint by 7.5% per tonne of crop without cutting fertilizer use. Modelled to maintain yields with lower fertilizer usage, that reduction rises to 25.8%.

“We were looking at how a higher NUE could be achieved without negatively affecting yields,” explains Levi Bin, account manager at the



(above left) Georg Lempert, global sustainability partnerships manager at ICL Growing Solutions; (above middle) Ronald Clemens, global portfolio manager CRF at ICL; (above right) Most CRFs have coatings which degrade slowly

Dutch farmer co-operative Agrifirm. “We also focused on what it takes to get a certified reduction in carbon footprint.” This reduction was certified by independent advisory service, Proba.

“This is about reducing emissions in the supply chain,” says Rutger Beens, co-founder of Proba, which provides tools to quantify and certify fertilizer emissions. Many food processing companies have net zero targets – and a large part of their scope three emissions comes from fertilizer use to produce the raw potatoes. “But farmers can't simply stop using fertilizer - yields would collapse.”

CRFs are about providing the right nutrients at the right time to optimise yields and reduce emissions – and using Proba's greenhouse gas methodology, the emission reductions can be quantified and certified. “This means food companies can report and finance those reductions, creating incentives throughout the supply chain to move to more efficient fertilizers.”

High input costs

In total, the three farms produced 1,832t of potatoes – averaging 58.87t/ha. Across the entire area, they emitted 24.76t of CO₂e – two tonnes

We need to feed a growing population, while cutting greenhouse emissions

less than the baseline. Of this, 44% related to production of the fertilizer, 34% to direct emissions, 20% to leaching and 2% to volatilisation.

Further evaluation of the figures shows a 1.7% reduction in production emissions, a 12.6% drop in direct emissions, a 6.9% fall in leaching and a 35.4% lowering of volatilisation.

“If you look at the carbon footprint of growing potatoes, about 40-50% is related to fertilizer – especially nitrogen fertilizer,” says Levi. Fossil fuels are required to produce nitrogen fertilizers, which gives them a high carbon footprint before they are even shipped to the point of use. “About 60% of nitrogen fertilizer's carbon footprint is in-field. If you can use less nitrogen to produce the same yield, that is highly beneficial.”

In the Netherlands, farmers are restricted on the amount of manure and mineral fertilizer they can use – and in the future, such restrictions may come in elsewhere. In the immediate term, high input costs mean farmers are already trying to

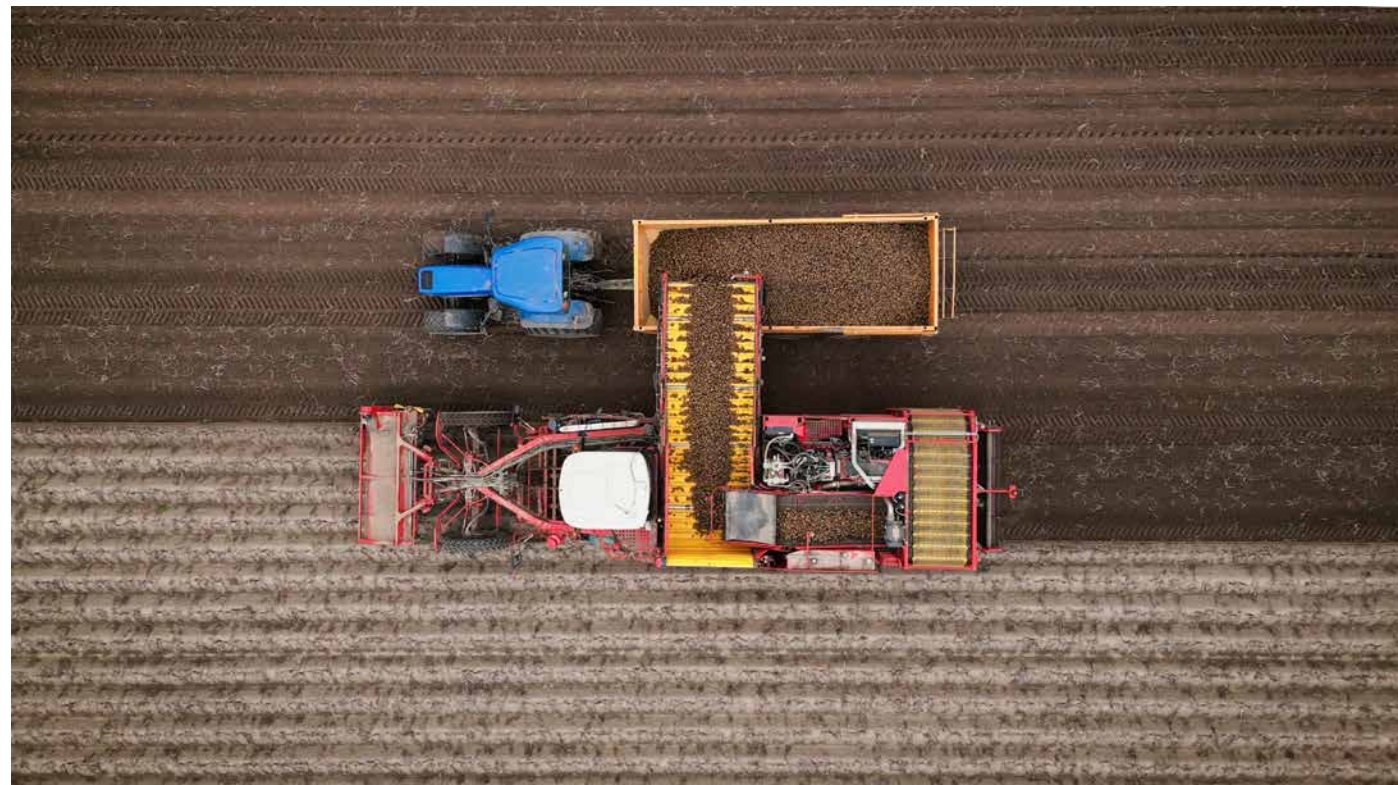
reduce their fertilizer use where possible.

CRFs are coated so that they release the nitrogen slowly, matching uptake by the plant. This reduces losses through leaching or volatilisation and thus improves NUE. So not only can farmers use less of it, the in-field emissions are also lower, notes Levi. “It's a two-fold benefit.”

Environmental progress

Most CRFs have coatings which degrade slowly – but eqo.x is 100% biodegradable. It is the first CRF product to obtain EU-recognised biodegradability certification ahead of mandatory standards set to be introduced in October 2028.

“This certification is more than a regulatory achievement; it's a statement of where the industry is headed,” says Ronald Clemens, global portfolio manager CRF at ICL. “With eqo.x, we are giving growers and our partners a proven, compliant, and future-ready solution that



Through slow release fertilizers, there are fewer peaks in the nitrogen balance, and this fits better with the crop needs

combines agronomic excellence with environmental progress.”

Levi already recommends the product to farmers growing high-value crops such as potatoes and onions, and suggests it is best incorporated into the soil before ridging. “In principle you only need to apply it once in a season, as opposed to top-dressing with calcium ammonium nitrate (CAN), hence reducing tractor passes and associated labour and diesel costs.” He typically blends it with regular mineral fertilizer, to provide immediate uptake to the plant followed by slower, controlled availability from the CRF.

As a result, crops will suffer less stress early in the season and will experience fewer nutrient deficiencies through the growing period. “We saw better tuber setting in the pilot last year, although we need more trials to verify this.”



Mark Haagsma, potato farmer in Luttelgeest, says the treated crops looked good, and the CRFs saved a lot of time in fertilizer applications. “Through slow release of the fertilizers, we have fewer peaks in the nitrogen balance, and this fits better with the crop needs. As a result, we also have less leaching,” he adds. “The application of this product is practical and efficient, and it can contribute to achieving your sustainability goals.”

Carbon credits

At a time when many food processors have net zero goals and are seeking to reduce their Scope 3 emissions, this technology has tremendous potential, says Levi. It can either be used to increase yields without boosting fertilizer usage, or reduce inputs without affecting yields. And the carbon measurements are scientifically proven. “So you can compare your carbon footprint against your previous baseline, with previous

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years, between crops, or with local or national benchmarks.”

Farmers could potentially monetise the carbon reduction in the form of carbon credits, but Levi sees better use within their own supply chain. “This is about insetting not offsetting. Insetting - reducing emissions within the product value chain - leads to measurable climate benefits. It adds value on the farm, in the product and across the value chain, creating stronger, more integrated partnerships across the food chain.”

The project enables food companies and other agri-buyers to access lower-carbon commodities while contributing to real and measurable climate action, notes Levi. “The pilot phase is designed not only to demonstrate technical and environmental impact, but to also validate the operational, financial, and organisational feasibility of the model.

“The outcomes provide the necessary evidence and confidence to scale the initiative, enabling a mechanism for decarbonising agriculture at scale. It ensures that the transition to more sustainable farming practices is co-financed by those sourcing the crops, rather than placing the burden solely on farmers.”

Sustainability strategies

The attitude towards sustainability is changing with the new political landscape, notes Georg. “I work with sustainability partners across the scale, and none of them are wavering



(top) The pilot study was held over 31.12ha on three potato farms; (above) ICL wants to find partners to scale the project up globally

in their commitment to their goals. But I think there is less money available – so being able to show a clear return on investment (ROI) is important.

“We’re seeing a course correction to more ROI-focused sustainability strategies and that’s where our methods have an advantage. It’s very easy to implement at farm level and throughout the supply chain, and it’s not expensive. It’s a win-win.”

ICL now wants to find partners who want to scale this up to 1000s of hectares globally. “We’ve got the business model, we can take it to other crops and other regions,” he adds. “We’re already doing multiple pilots in other countries – such as coffee in Brazil, for example, and can look at other sectors such as sugar beet if demand is there.”

This is just the beginning, says Georg. “The technology is here. It works, it is certified, and everybody in the food chain wins.” ■