

From waste to resource: recovering nutrients to fertilise the future

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Figure 1. Photo from Nel Ranoko on Unsplash

Europe faces growing food supply demands and a shortage of non-renewable raw materials for fertilisers. But producing more from available resources is possible, say researchers: "The nutrients we need are before our eyes, ready to be transformed."

European farmers face a monumental dual challenge: increasing food production while meeting daunting deadlines imposed by the [green transition](#). Amid the drive to produce greener, more efficient fertilisers, new technologies seek to squeeze maximum potential from nutrients that have long been imported, but which until now have been under-exploited. "An important part of the nutrients we have been importing for years are here, ready to be transformed and to be given another life," says Javier Brañas Lasala, Director of Research, Development and Innovation at the Spanish fertiliser producer [Fertiberia](#). Using nutrients from bio-waste to reduce Europe's dependency on non-renewable raw materials and increase the efficiency of new sustainable fertilisers is one of the main goals of [B-Ferst](#), a 5-year European project he coordinates, due to end this October.



The European Commission president has [highlighted the challenge](#) of securing future food supplies, via sustainable farming that protects nature and respects climate goals. Where are we at globally in facing that challenge?

We're on the way to guarantee the food supply for everyone, but it's still not achieved. The population is growing and unfortunately there are countries and people that don't have enough food. So, we need to increase food production, but we cannot use more land. We need a technological increase in farming systems, to produce more per hectare in a sustainable way. The challenge is very big, because Europe has decided to increase the surface area dedicated to organic farming to 30% in a few years, and organic farming is less productive than traditional farming. So, we must bet on high value-added products and put together all the knowledge we have in order to be much more efficient and at the same time more respectful of the environment.

In recent years we've seen the pandemic, war in Europe, ongoing disruption to supplies, higher prices. How urgent does that make this transition?

As fast as possible, but I'm not sure if we're getting there on time, because it's not an easy challenge. However, the European Commission has been very clear with dates and deadlines and together with European companies it's putting a lot of money into research and innovation.

The EU still depends on non-renewable raw materials and uses natural gas as its main energy source for producing fertilisers. Are we still not a long way off achieving set goals?

It must be step by step. Europe doesn't have the natural resources to produce the nutrients needed for farming. But we do have a large part of the nutrients we've been importing for years: in waste treatment plants, in agricultural soils. We have them here -- tons and tons of phosphates and potash and so on -- ready to be transformed. We've been trying to do that, for phosphorus and for potassium mainly. With nitrogen fertilisers we have the same problem: nitrogen plus hydrogen produce ammonia, and the hydrogen comes from natural gas. Even so, many companies in our sector are setting very ambitious decarbonisation targets, betting on renewable energies and innovating to gradually reduce their carbon footprint and to offer European agriculture sustainable and smart crop nutrition solutions, in line with what society demands.

The B-Ferst project set out to valorise underexploited bio-waste, develop new green fertilisers, substitute raw materials, and cut energy consumption. How much has been achieved?

We have two goals here: one is nutrient recovery; the other is to increase the nutrients' performance. The first -- the circular economy, the re-use of nutrients from bio-waste -- is not easy: a lot of new technologies are under development, but they're not cheap. There is a logistic issue: the residues are produced in different places, their composition varies



during the year, supply is temporal, mostly the nutrients need to be concentrated. You can't transport low-concentrated bio-waste nutrients far: moving liquid manure 400 kilometres, for example, is expensive. An industrial process is needed to transform a bio-waste into a raw material. Some bio-waste is suitable for fertiliser production, but most needs more development. The project's objective wasn't to make fertilisers 100% from bio-waste because that's nearly impossible at a big scale. But we can produce fertilisers by partially substituting nutrients, with about 20% coming from bio-waste. However, to have more impact in Europe, with more fertiliser producers doing the same, a bigger effort is needed from waste management companies to develop processes to transform this bio-waste into raw materials.

And the second objective, to increase the nutrients' efficiency?

We've got that through the development of bio-stimulants that increase the efficiency of the nutrients you apply to the soil. It's very exciting to see how we can make these fertilisers [more efficient and more advanced](#). We've also produced special innovative coatings to protect the bio-stimulants, increase the nutrients' efficiency and protect them in the soil from leeching. With these new additives we've found we can increase production by between 5 to 15%.

Some reports identify potentially serious barriers, particularly financial and on crop yields. Other reports have also highlighted problems with pricing and regulation. Won't the new fertilisers be too expensive for farmers?

Pricing, like quality, is of course very important: in the end if it's not economically viable it won't work. Of course, transforming bio-waste into a raw material and moving it from the point of production to the fertiliser plant are costly but farmers aren't going to pay much more for these fertilisers; it's hard enough for them producing food for us, we can't make their job harder still! Any difference in price between BFerst fertilisers and conventional ones should be small, but the benefits will be much higher. So, our message is: "yes, maybe this will be just a little more expensive, but we're going to produce more per square metre".

Higher yields...

Yes, in the end it's going to be a win-win, they're going to produce more, and via a circular economy that uses high-technology bio-stimulants to make fertilisers. We get everything we were looking for: higher yields, lower environmental impact.

Are there communication problems with the industry and can they be overcome?

I think the farmers will always valorise the best product for their business. The first thing is to show that their production has been higher per kilogram of nutrient they're applying. So, on numbers alone, farmers will be convinced by the economic benefits. Afterwards, we'll



highlight the environmental advantages such as carbon footprint and waste reduction -- and argue that they're contributing to make Europe stronger because we'll be less dependent on natural resources from abroad, very important at a time of international tension.

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