

New technology to produce plant proteins and low carbon, regenerative fermented products developed in France by Intact

- Intact, a company founded by Alexis Duval, Fanny de Castelnaud and Christopher Hervé, has developed a technology enabling **vegetable proteins and fermented pulse products to be produced via a circular production process**. Our products, which have applications in the food, cosmetics and pharmaceutical industries, represent a sustainability breakthrough.
- **This technological innovation will significantly cut greenhouse gas emissions across the entire production cycle**. Pulses (peas, field beans, lentils and similar) are the only plants in the world capable of using the nitrogen in the air to fertilise the soil naturally. In addition, their greenhouse gas emissions are low. Thanks to several manufacturing innovations, Intact has succeeded in significantly reducing the carbon emissions of pulses and in harnessing their ecological potential for low-carbon agriculture.
- **A regenerative model**. Pulses can also contribute to the development of regenerative agriculture, with numerous benefits for health, farmers and the environment. Intact has launched, in partnership with **Axereal** – which acquired a 20% stake in the company in June 2022 – a major regenerative agriculture channel in the Centre-Val de Loire region of France. It is based on making better use of pulses in crop rotations, reducing tillage, developing the use of cover crops and giving more consideration to the challenges of biodiversity. The channel also helps to revitalise the soil and boost the proportion of organic matter, to make farming more fertile, resilient and competitive, and sequester more carbon in the soil.
- **A circular model**. Pulses are rich not only in protein, but also in starch. Through a circular fermentation process protected by a patent application, our technology captures the starch in pulses as low-carbon products.
- **Eating habits are changing to include more natural, plant-based products**. The food industry and institutional catering are using more and more vegetable proteins in their recipes. But all too often, these still have to be imported. Our proteins represent a local, sustainable and healthy alternative. Our technological process is natural (no additives, chemicals or solvents) and preserves the fibre and nutrients in the plant.
- **Intact's fermented products emit up to three times less carbon than products made using conventional processes**. Fermentation numbers among the industries that emit high levels of greenhouse gases. Intact's products are ushering in a new era of socially and environmentally responsible low-carbon fermentation.
- **An industrial investment of €50m**. Intact is preparing to scale up its technological process and will break ground on its first production site in 2023. This site, situated in the Centre-Val de Loire region of France, will create 50 direct jobs and support the development of a 50,000-hectare regenerative agriculture channel.

Intact was founded by Alexis Duval, Fanny de Castelnaud and Christopher Hervé as 3S Ingrédients before changing its name to reflect its determination to contribute to the vital regenerative transition.

It intends to scale up its technological process and in 2023 will break ground on its first production site near Orleans, in the Centre-Val de Loire region of France.

To assist them in implementing their project, Intact's directors can count on the backing of Axereal, France's largest agricultural cooperative by origination volume, and support from the region's economic agents. The Centre-Val de Loire regional council, the Dev'Up Centre-Val de Loire development agency – responsible for coordination – and central government agencies have provided Intact with technical and financial support for the manufacturing site project.

Alexis Duval, CEO of Intact, said: "The technology that we have developed here at Intact represents a major advance in accelerating the transition towards a low-carbon, regenerative model which is beneficial for farmers, society and the environment. We would like to thank Axereal and the Centre-Val de Loire regional council for supporting us and for the part they are playing in the emergence of an innovative, sustainable new channel, rooted in our region."

Jean-François Loiseau, Axereal Chairman, said: "Axereal, our cooperative group, has demonstrated its strong commitment to the agricultural and food transition by becoming Intact's shareholder and partner. Our aim for this partnership is to develop profitable, protein-rich crop channels under regenerative agriculture systems. We will support our cooperative's farmer members to move towards technical itineraries that use lower quantities of chemical inputs, while ensuring they receive optimal incomes."

François Bonneau, Chair of the Centre-Val de Loire regional council and of Dev'Up Centre-Val de Loire, said: "This is a magnificent new project for our region. Not only is it innovative, but it makes real sense to us here in Centre-Val de Loire, given that we are committed both to developing the production of vegetable protein and to protecting the environment. This new manufacturing site is a perfect fit for the region's food industry which is investing and innovating to solve current and future food challenges. Intact Regenerative's project also represents new openings for processing and deriving value from the region's products, and therefore new opportunities for all our farmers."

Press kit

Agriculture – a major environmental challenge

Agriculture is responsible for 20% of the world's greenhouse gas emissions. The main two greenhouse gases it emits are nitrous oxide and methane, which have global warming potentials 300 times and 25 times higher respectively than CO₂. In France, these two gases alone account for 85% of agricultural emissions (45% for methane and 42% for nitrous oxide) versus 13% for CO₂.

The food processing industry also uses energy-intensive processes. The conventional processes for separating starch (or sugars) from proteins are among these.

The natural nitrogen cycle

In France, emissions of nitrous oxide from agriculture produced 33.6Mt of CO₂ equivalent in 2019, representing almost 8% of the country's total emissions.

To grow and synthesise proteins, plants need to draw nitrogen from the soil. Synthetic nitrogen fertilisers are used to stimulate the growth of plants in the short term. But their production is fossil-fuel intensive, they contribute to nitrous oxide emissions and the run-off (nitrates) from them is detrimental to water quality. Using excessive quantities of fertilisers can lead to a vicious circle: they encourage certain bacteria to multiply and disturb the balance of the soils, which affects the way organic matter is broken down, so that more fertilisers are required to avoid nutrient deficiencies.

Intact has put in place a fertilisation cycle that uses natural nitrogen from pulses. Pulses are the only plants in the world capable of fixing the nitrogen from the air in the soil. Thanks to symbiotic action by bacteria known as rhizobia, they fulfil an essential agronomic and environmental function by putting into the soil the nitrogen that is so important to both plants and people.

Regenerative agriculture through a four-pronged approach

Intact's agricultural model takes a four-pronged approach: including pulses in crop rotations, reducing tillage, increasing cover crops and cutting the use of chemical intrants.

A soil rich in organic matter maintains biodiversity by providing a more suitable habitat. It has a better, more aerated and stable structure, more able to resist erosion and compaction. It is more fertile and better placed to retain water to withstand droughts, prevent flooding and efficiently recharge aquifers. It captures more carbon and sequesters it in the soil more effectively.

Healthier soil also makes for healthier food because certain bacteria help break down pollutants, and because the plants draw from the soil the nutrients we need in our diets. Nitrogen is, for example, an essential component of the amino acids which are the building blocks of protein.

Intact is committed to offering ingredients produced using the principles of regenerative agriculture and regenerative and organic agriculture, as the two models are perfectly compatible. Pulses are in fact commonly used in organic agriculture as an alternative to nitrogen fertilisers.

More fertile, resilient farmlands

For farmers, improved soil health helps to make land more fertile and boost its climate resilience. It also helps farms reduce their dependence on nitrogen fertilisers, saving them money and smoothing revenue streams.

A circular model

Intact's technology is circular, which is an advantage in terms of both sustainability and competitiveness. Pulses contain 60% starch and 25% protein. It is essential, to ensure the model is both sustainable and competitive, to unlock the value of both of these components. Intact has developed a globally exclusive technology, protected by a patent application, that uses a circular process to recover the protein and starch from pulses.

Healthier diets

France's PNNS (national nutrition and health plan) aims to improve the health of the population through action on diet, which is the main lever for preventing and protecting people from a large number of diet-related conditions (including overweight, obesity, diabetes, cardiovascular disease and certain cancers). Among its priority objectives, the PNNS 4 aspires to cut the proportion of ultra-processed foods in diets by 20%. It also aims to increase fibre consumption. To this end, it recommends eating pulses (twice a week) in addition to fruit and vegetables.

In contrast with the majority of options on the market, Intact's plant proteins are obtained using a natural technological process. Conventional processes transform the proteins (they are "denatured"). Intact's technology does not use any additives, chemicals or solvents. It also preserves a large proportion of the fibre and nutrients naturally present in the plant. Our ingredients are rich in iron, magnesium, potassium, phosphorous, zinc, manganese and vitamins B1, B3 and B6. They are low in sugar, sodium and saturated fats. They are well tolerated (except where there are allergies). They can be used in numerous applications and fit into a wide range of diets.

Intact's fermented products emit up to three times less carbon than products made using conventional processes.

The fermentation industry is a heavy emitter of greenhouse gases, because a large amount of energy is required to separate sugars (or starches), proteins and fibre. Options for decarbonising conventional technologies are limited, costly and complex to put in place.

Intact products are ushering in a new era of low-carbon fermentation. They reduce greenhouse gas emissions across the entire production cycle. They do not use neonicotinoids or GMOs. They are helping make the agricultural sector more resilient.

An industrial investment of €50m.

Intact was founded in 2021 by Alexis Duval, Fanny de Castelnau and Christopher Hervé as 3S Ingrédients, before changing its name to reflect its determination to contribute to the vital regenerative transition.

It intends to scale up its technological process and in 2023 will break ground on its first production site near Orleans, in the Centre-Val de Loire region of France.

The industrial investment of €50m will support the development of a major regenerative agriculture channel in the Centre-Val de Loire region, backed by Axereal cooperative group which acquired a stake in Intact in June 2022. It aims to convert 50,000 hectares of agricultural land to regenerative agriculture.

Headquartered in Olivet, in France's Loiret department, Axereal is an agricultural and food processing cooperative with 11,000 farmer members. It is France's leading cereal and oil- and protein-seed crop cooperative by origination volumes, working to develop production and sustain it in the long term to help provide quality food products.

To assist them in implementing their project, Intact's directors can count on support from the region's economic agents. The Centre-Val de Loire regional council, the Dev'Up Centre-Val de Loire development agency – responsible for coordination – and central government agencies have provided Intact with technical and financial support for the manufacturing site project.

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