

Samabriva's precision biomanufacturing platform

Industrializing hairy root-based expression system for a sustainable and local production of natural substances.

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Samabriva: a European bioproduction company



Samabriva, SA
France

Founded in July 2011

Historical entity (spin-off from Amiens University)

R&D center (development of bioproduction processes for customers)



**Samabriva
Biomanufacturing, SA**
Belgium

Founded in Nov 2023

100% subsidiary

CDMO activity (Industrial production of high value molecule)

Samabriva at a glance

Samabriva is building an
Innovative Bioproduction Process

Samabriva's versatile platform
COMBINES THE ADVANTAGES OF:

1) Plant-based systems
(cost-effectiveness,
animal-free process)

2) Usual biomanufacturing
systems
(complex molecules produced
in large scale bioreactors)

→ EUR 9 m raised to date
(dilutive and non dilutive funds)

→ Industrial contracts already set up with large
companies

TO
PRODUCE
API*s:

→ **Natural active molecules from
plants** (secondary metabolites)

→ Recombinant proteins

* API: Active Pharmaceutical Ingredients

Samabriva, a company that meets today's challenges:

Political



Ensuring **Europe's sovereignty** in terms of essential health products by guaranteeing the supply of these essential purchases in all circumstances (**relocation**).

Public health



Control or even reduction of bioproduction costs to **improve access to healthcare**

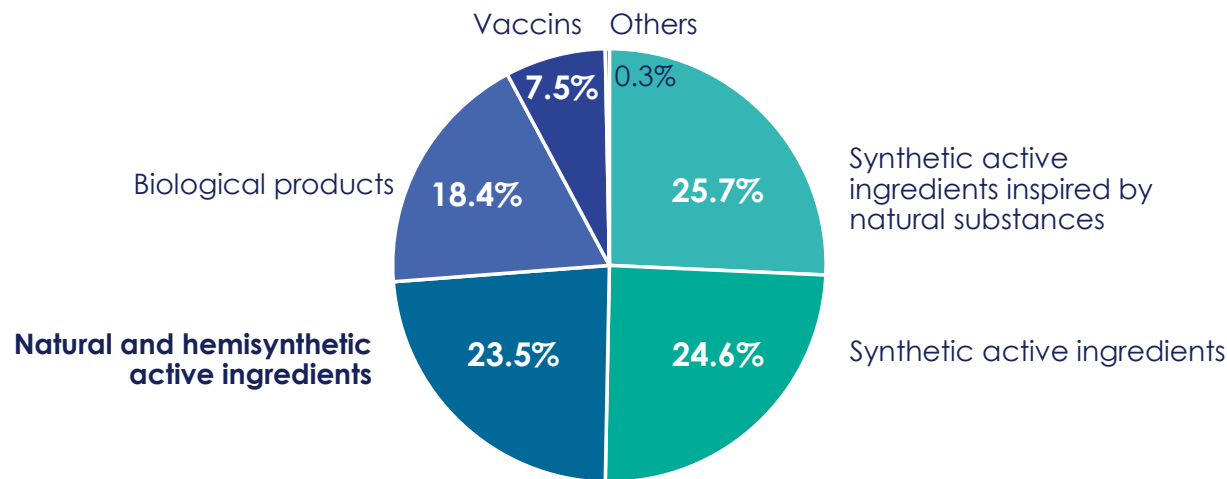
Environmental



- Carbon footprint reduction
- No use of pesticides or insecticides
- Deforestation limitation

Place of natural substances in the therapeutic arsenal

Plants are the most important source of natural substances used in therapeutics.



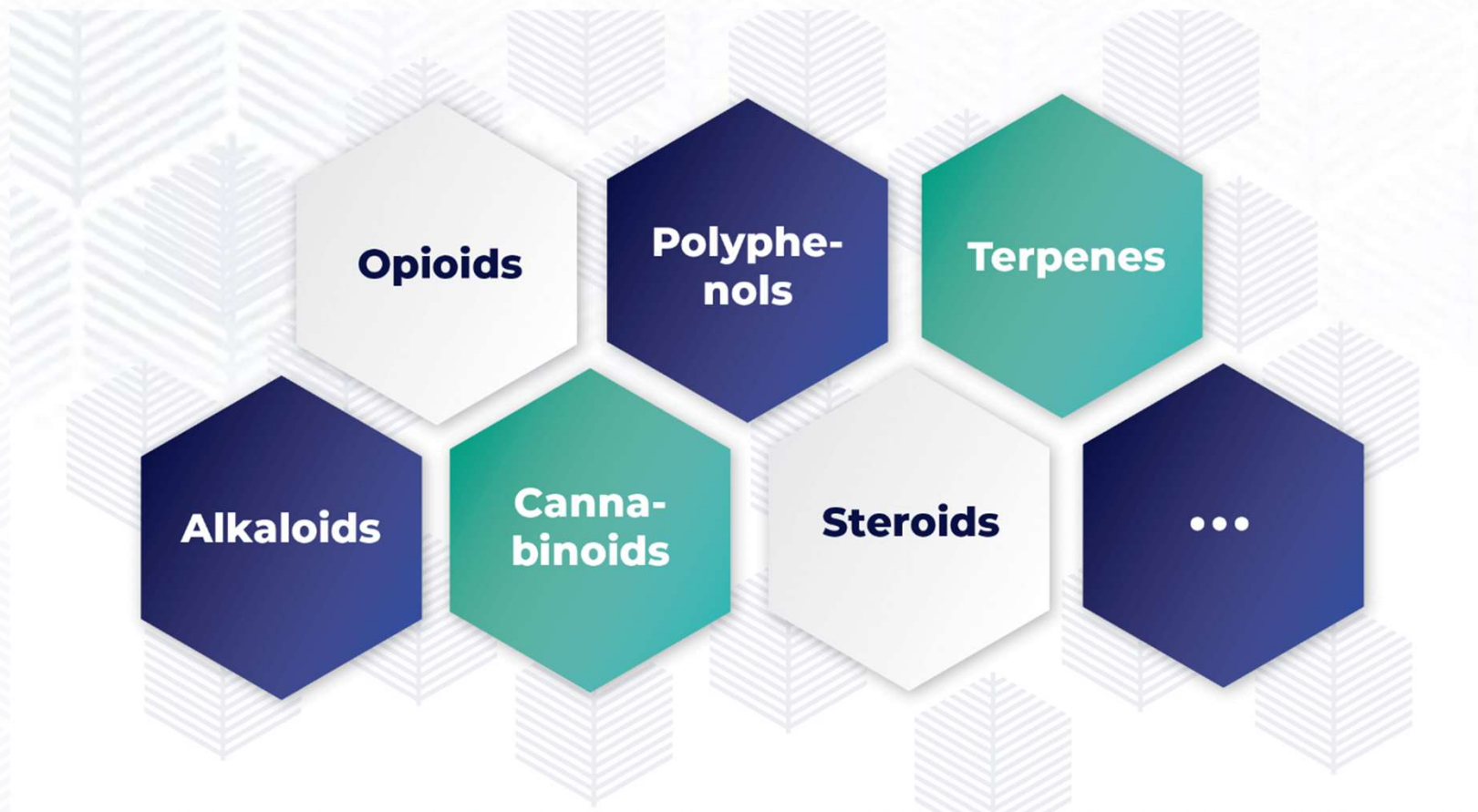
Place of natural substances in the therapeutic arsenal over the period 1981-2019, out of 1,881 marketing authorizations (MA) granted by the Food & Drug Administration (Journal of Natural Products, 2020)

Whether they are used as they are, extracted, produced synthetically or modified by hemisynthesis, natural substances are often **at the origin of entire therapeutic classes.**

High potential for innovation:
>300,000 molecules in nature are "natural substances" with pharmaceutical potential

Natural molecules derived from plants display anti-cancer, anti-inflammatory and pain-relieving properties, and are therefore used in a wide range of treatments

Examples of pharmaceutical molecules still extracted from field-grown plants



A difficult relocation

The situation

About 80 % of API used in medicines produced within the EU come primarily from China and India

Source: parliamentary question - O-000049/Nov 2022

Oct 2023

The EU Commission announced plans to create a Critical Medicines Alliance by 2024, with the aim of identifying the most vulnerable drugs that could benefit from extra measures to shore up supply

... but **how active molecules** extracted from plants, grown in open fields, and not chemically synthesized **can be relocated?**

Current production systems are unsustainable



Supply chain management

Existing secondary metabolite production methods in open-fields face **numerous challenges:**

- Competition with **food crops**
- Large **footprint**
- **Inconsistent quality and productivity** (batch-to-batch variability)
- **Seasonality and long** production cycle
- Climate **risks and geopolitical tensions**
- Substantial **carbon footprint**
- **Increasing costs**



Escalating crises will permanently disrupt open field production of APIs

Samabriva's solution: from field to factory



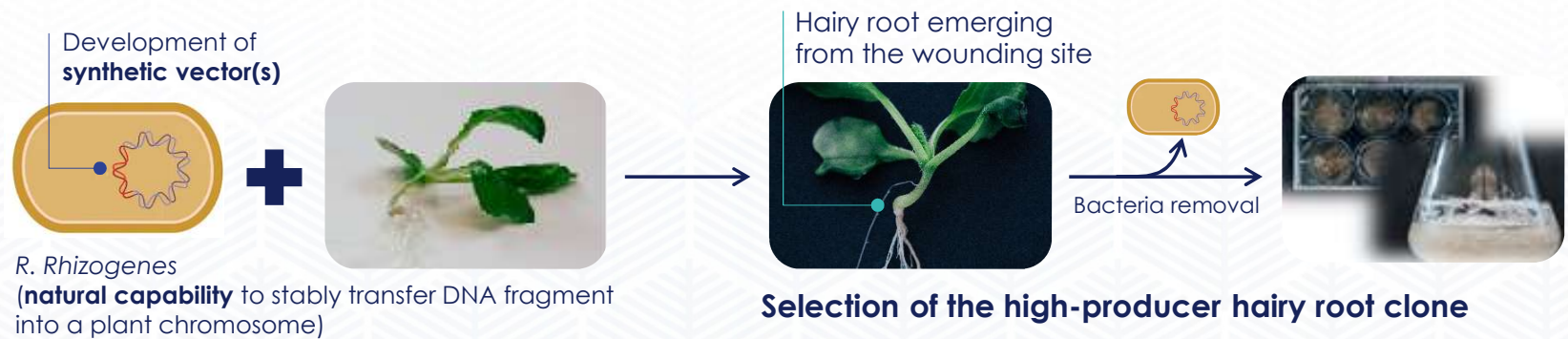
Samabriva's innovative process makes possible

- **To relocate** the production of active molecules currently produced in open field in countries whose climate is not compatible with that of Western Europe
- A complete **control over the supply chain**, while keeping **costs under control** (using cost-effective reagents and media, minimizing energy requirements and increasing productivity)

The process

The process

We've turned a natural event ...



Genetic engineering

Ability to take control of the plant metabolic pathway (productivity increase of selected natural molecules)

Ability to stably produce complex heterologous proteins



Mastering of the process

Generation of hairy roots from a wide variety of plant species

Optimization of the growth capacities and productivities using **quality by design strategies**

Conditioning of the clones to **enhance their natural ability** to produce the molecule of interest



Large scale & controlled production

Ability to produce and secrete the molecule(s) of interest at large scale (until 350L so far) **in a fully controlled and confined environment**

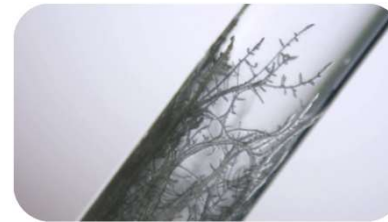
... into a **robust biotechnological process**

Samabriva's versatile technology provides a controlled process from the sequence design to large scale bioproduction

Phase 1: **ROOT CLONE DEVELOPMENT** (in Samabriva, Fr)



Generation and selection of the **high-producer hairy root clone** (stable transformation)



Clone amplification and optimization (optional)



Generation of a stable root clone producer with high production capability

Phase 2: **MANUFACTURING** (in Samabriva Biomanufacturing, Be)



Up-scale and culture in **single-use bioreactors** (aim: 500L to 1000L-bioreactors)



Concentration and purification (if requested)



Generation of a process of production ready to be used in routine

(Transfer tech, Production by Samabriva or a selected CDMO)

Samabriva's bioproduction technology takes plant-based production out of the field and into the factory

Samabriva's innovative **hairy root culture** enables complete **supply chain control** while being **cost-effective**, highly productive and safe (animal-free)

KEY BENEFITS of Samabriva's production system

- 1 Control of the supply chain** with continuous, reproducible production all year round.
- 2 Sustainability:** greater efficiency, consistency and purity.
- 3 Avoid climate risks:** gain greater batch-to-batch consistency.
- 4 Low carbon footprint:** energy efficient technology. No light, heat or transport.
- 5 Continuous production:** no seasonality with year-round production.
- 6 Enriched molecule content:** improved yields and cost-effective purification from process and genetic improvements.
- 7 Animal component free:** vegan expression system.
- 8 Compact footprint:** high yield of the desired molecule.

Partner with us!



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