THE CONSORTIUM

The CHIC consortium consists of seventeen internationally leading industrial, academic and public partners that are located in 10 EU Member States, one Associate Member State (Serbia) and in New Zealand.

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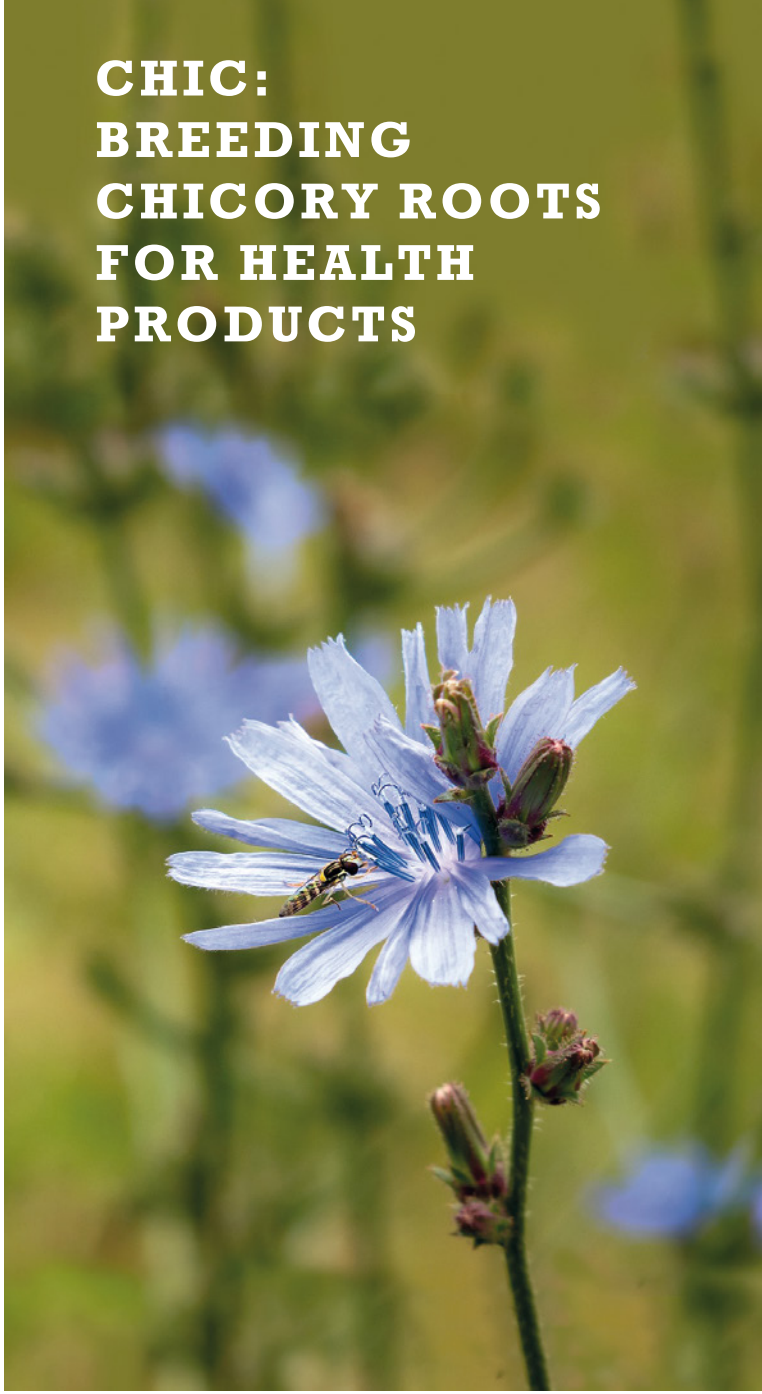
CHIC

CHIC: BREEDING CHICORY ROOTS FOR HEALTH PRODUCTS



CHIC

WHAT IS CHIC?

CHIC is a 7.3 million € project funded by the European Commission under the H2020 programme. Horizon 2020 allocates more than 80 billion € to research and development to help solving the complex challenges of European societies.

The aim of CHIC is to develop chicory crop varieties to increase the diversity and sustainability of agricultural production while serving consumer needs. These varieties shall produce improved dietary fibres and medicinal compounds. CHIC also aims to launch a broad discussion and create public awareness regarding New Plant Breeding Techniques such as CRISPR.

WHY CHICORY? INULIN AND TERPENES

Industrial chicory is being grown mainly to produce inulin, which is valuable as a dietary fibre and sweetener. It is used, for example, in bread and dietary products.

The chicory plant has a single large root (taproot), from which inulin is extracted. Inulins are food fibres of varying lengths that are mainly composed of fructose. Inulin acts as a prebiotic that promotes the growth of beneficial gut bacteria and stimulates our immune system.

Some other interesting compounds are also present in the chicory root, such as terpenes. Terpenes occur naturally in many plants. The terpenes found in chicory and Belgian endive give them their valued bitter taste. Earlier research provided evidence that the terpenes in chicory provide health benefits because of their anti-microbial and anti-cancer activity.

NEW PLANT BREEDING TECHNIQUES (NPBTs)

Developing a new chicory variety with conventional plant breeding could take between one and two decades and these techniques usually only provide small incremental improvements. The traits that CHIC aims to improve are almost impossible to achieve using conventional plant breeding only. The goal, therefore, is to develop and implement four different New Plant Breeding Techniques (NPBTs) to convert chicory into a new and robust multipurpose crop for the bio-based economy, a crop that can produce improved dietary inulin and bioactive terpenes with human benefits.

The consortium evaluates the technical performance of these four NPBTs, as well as the safety, environmental, regulatory, socio-economic and broader societal issues associated with these improved chicory varieties. CHIC strives to ensure responsible innovation and to raise public awareness by involving stakeholders and considering their needs and concerns in all phases of the project.

RANDOM MUTATION

Conventional plant breeding

Generally relies on techniques where the outcome is difficult to predict and requires between 7 and 25 years, depending on the crop.

1.000.000 plants, 10 years

This is not compatible with the need to adapt plants to our rapidly changing environment and develop plant varieties that can feed the growing population and fulfil its demand for diverse and healthy diets.

DIRECTED MUTATION

NPBTs

Allow plant breeding to develop these improved plant varieties in a similar - but more precise - manner and in a significantly shorter timeframe.

100 plants, 1 year

By making small changes in the genome of the plants, we can produce new and better products for the benefit of the consumer´s health.

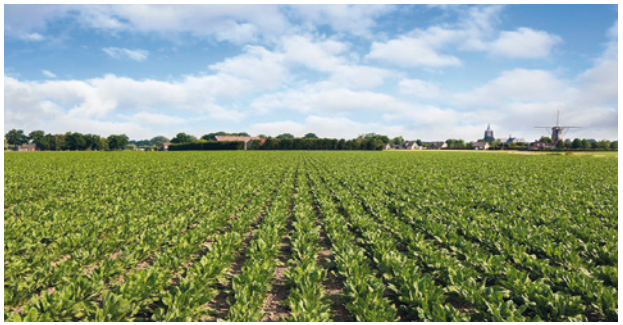
WHAT IS CRISPR?

CRISPR is a natural defence system that protect bacteria against attacking viruses. It can also be used as a plant breeding tool and in human medicine. These applications have been developed over the last decade. CRISPR has already produced revolutionary advances in the treatment of genetic diseases and, in the future, it could improve agriculture.

New Plant Breeding Techniques like CRISPR can be used to generate plant varieties that are better adapted to our changing climate or that can contribute to improving our environment by creating robust crops that require less agrochemicals or nutrients.

The idea behind using NPBTs is to introduce only directed mutations, those that will generate the intended improvement. This method is more precise and, since little or no back crossing is required to remove additional mutations, it is much faster. CRISPR technology is a simple yet powerful tool for optimizing plant properties at a pace that can keep up with changing environment and consumer needs.

By developing and implementing a set of NPBTs, CHIC will consolidate chicory as a production system for high-quality dietary fibres and establish it as a source of bioactive terpenes. The consortium will evaluate the efficacy and potential benefits and risks of the process, evaluate the socio-economic consequences, and develop business plans for commercialization of the new chicory products.



EXPECTED IMPACTS

- A contribution to the EU goals of improving the sustainability of agriculture and the bio-based economy by developing new types of useful crops.
- New data for the assessment of innovative NPBTs as tools for future plant breeding and their potential for a speedy uptake in general breeding practice.
- Innovation in the way plant breeding technologies are introduced to the public, to improve understanding of biotechnology and enhance informed decision making.