Issue 1 – April 2019

Newsletter

CHIC: healthier chicory and responsible innovation

EDITORIAL:

The first year of the CHIC project has passed. CHIC is a highly interdisciplinary project with 17 partners. The first few months were used to coordinate in detail activities within the work packages, among work packages leaders and between the partners of the project. For a complex project like CHIC, this is essential. On this basis, the consortium moved on to more substantial tasks.

By now, three major project's parts (Technology, Communication & Stakeholder Engagement and Impact assessment) are in full swing. The first genome edited chicory plantlets are growing in several laboratories, the stakeholder advisory group was established and the impact on the European Court of Justice ruling on the project and on the whole field has extensively been discussed within the consortium and with external experts. Communication channels, such as social media accounts, are active and partners presented the CHIC project at various events for school-age children. A short, informative animation movie explaining the project was created. Our first progress meeting was organised after nine months at Keygene, in Wageningen, which allowed us to conclude that the project is on track and that we will continue according to plan. We are - I hope just like you - very curious about the results from the upcoming project period.

Dirk Bosch, project coordinator

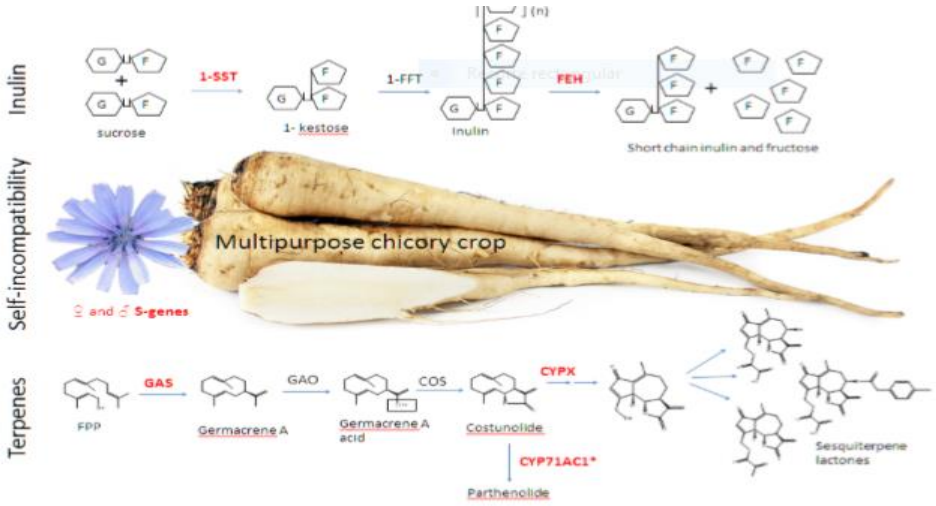
CHIC is an EU Horizon 2020 funded € 7.3 million project for the development and application of New Plant Breeding Techniques (NPBTs) for chicory. The consortium of 17 participants includes SMEs, an industrial partner, NGOs and research institutes from 11 European countries and one from New Zealand.

The project aims at developing chicory varieties as a crop to increase the diversity and sustainability of agricultural production while serving consumer needs. These varieties shall produce improved dietary fibres and medical compounds.

CHIC also aims create awareness and facilitate discussion about NPBTs, such as CRISPR, to allow informed decision making by all stakeholders, including the public.

About CHIC: towards the multipurpose crop for dietary fibre and medicinal terpenes

Chicory varieties, such as the well-known Belgian endive and the Italian radicchio, have been used as food in salads for a long time. They are appreciated for their characteristic bitter taste. The crop that is called root chicory is cultivated for food fibre inulin.



Inulin is a prebiotic; it boosts the growth of beneficial gut bacteria and stimulates our immune system. The inulin fibre is included in food such as yoghurts and cereal bars as low-calorie sweetener, fat replacer and to enhance gut health. In Europe, root chicory is mainly cultivated in the Netherlands, Belgium and the Northern part of France.

In addition to inulin, chicory roots store different terpenes. Terpenes are organic compounds naturally occurring in many plants. The terpenes give chicory varieties their typical bitter taste. Some terpenes can also inhibit the growth of fungi or bacteria, as antibiotics, or are reported in scientific publications to prevent cancer cells from growing.

Therefore, the terpenes from chicory could be processed to generate new medicinal drugs. The CHIC project aims to improve the quality of chicory with clear consumer benefits. We will make specific and targeted changes in the genome in order to develop a chicory plant that on the one hand produces more and healthier inulin and on the other hand produces sufficient amounts of medicinal terpenes. Whereas it can take easily between one and two decades to develop a new plant variety by conventional plant breeding, the use of new plant breeding techniques in CHIC allows to develop new chicory varieties in a much shorter time.

The CHIC consortium will evaluate the efficiency of a certain new plant breeding technique known as genome editing, as well as the safety, environmental, regulatory, socio-economic and broader societal issues. By involving stakeholders and by raising public awareness at all phases of the project CHIC strives to ensure responsible and desired innovations.

NEW PLANT BREEDING TECHNIQUES (NPBTs)

Developing a new chicory variety via conventional plant breeding takes time, between one and two decades, usually providing only small incremental improvements. Some of the traits CHIC wants to improve are almost impossible to achieve by conventional plant breeding only. Therefore, the ambition of CHIC is to develop and implement different New Plant Breeding Techniques (NPBTs) to convert chicory into a robust multipurpose crop, that will produce products with human benefits.

CONSUMER AND STAKEHOLDER DIALOGUE

In public debates, NPBTs frequently raise high expectations as well as strong concerns. Therefore, CHIC will involve a broad range of stakeholders to raise awareness and discuss issues associated with the chicory varieties developed in the project and with NPBTs in general. These include techno-economic potential, health benefits, possible environmental and socio-economic impacts, broader societal issues, safety concerns and risk mitigation as well as regulatory and policy measures. Moreover, CHIC will engage with artists who will make themselves familiar with the NPBTs and express their feelings and views in pieces of art, including art installations to inspire a broader public debate.

CHIC STRATEGIC OBJECTIVES ARE:

IMPLEMENTATION OF NEW PLANT BREEDING TECHNIQUES (NPBTS) IN CHICORY

CHIC will develop four different new plant breeding techniques. They will be used to steer bioprocesses in chicory and mobilize its under-explored potential to produce prebiotics that stimulate gut health and medicinal terpenes from chicory.

CO-INNOVATION PATHWAYS FOR GAME-CHANGING NEW PLANT BREEDING TECHNIQUES

The chicory varieties developed in CHIC will be assessed with respect to technological potential, consumer benefits and risks, and their socio-economic impacts. This will be done via a close consultation with different stakeholders. Expectations and concerns from both society and industry will be considered. Different business cases for inulin and terpenes will be developed to initiate commercialisation of the CHIC results.

IMPLEMENTATION OF INNOVATIVE COMMUNICATION TOOLS AND MEANS TO IMPROVE INTERACTION WITH THE PUBLIC

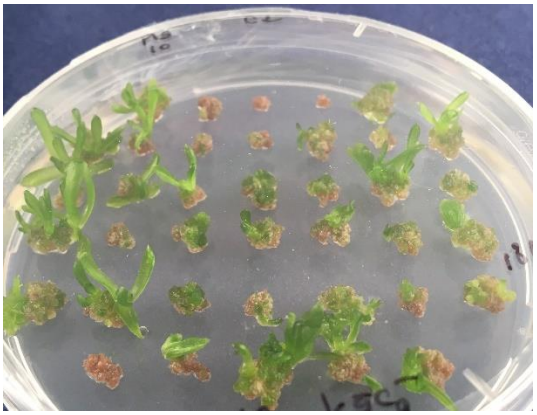
The implementation of innovative communication activities, including communication tools linking art to science to improve communication and understanding of New Plant Breeding Technologies by the public.

CHIC Work Packages:

WP1	Development of four conceptually different NPBT	KeyGene
WP2	Implementation of NPBT for dietary inulin	WAGENINGEN UNIVERSITY & RESEARCH
WP3	Implementation of NPBT in chicory for bioactive terpenes	Leibniz Institute of Plant Biochemistry
WP4	Technical- and risk- and regulatory assessment of NPBTs	JKI Julius Kühn-Institut Federal Research Centre for Cultivated Plants
WP5	Socio-economic and environmental impacts on the whole value chain	JOANNEUM RESEARCH LIFE
WP6	Stakeholder engagement	TU Graz Graz University of Technology
WP7	Exploitation, dissemination and communication	ID consortium
WP8	Commercial exploitation of chicory as a multipurpose crop	VTT
WP9	Management	WAGENINGEN UNIVERSITY & RESEARCH
WP10	Ethics requirements	WAGENINGEN UNIVERSITY & RESEARCH

Since the launch of the project in 2018, considerable progress was made by the team

During this period, researchers working on the development of different NPBTs genome editing approaches, made the first designs for transformation constructs expressing guide RNAs. The first gene edited chicory plants have been obtained by several laboratories. This now awaits experimental confirmation.



The team has produced the first proof of concept of obtaining intended and precise mutations in chicory. Using CRISPR-Cas9 one of the genes involved in the biosynthesis of terpenes was altered in the intended way in cell cultures of chicory, and several genes involved in the biosynthesis of inulin proofed to be precisely mutated in a large number of regenerated plants.

The team has also developed a laboratory protocol for the development of fully-grown chicory plants, starting from individual plant cells in culture. This so-called regeneration is crucial since genetic changes made by the CRISPR-Cas method are always created in single cells, not in all cells of a whole plant at once. Therefore, scientists need to be able to grow the single, genetically improved cells into complete plants.

The Stakeholder Advisory Group (SAG) was successfully set-up and the first meeting had been established in the second month of the project. The SAG is currently being expanded.

Communicating CHIC

H2020 CHIC project video on Youtube

H2020 CHIC project video on Youtube

The communication and dissemination infrastructure had been developed, by creating dedicated social network accounts, the website and the promotion of Art and Science activities: the artists can participate in the joint Artists in Residence programme.

A video about the project has been released and shared on all the main CHIC's social media accounts and communications channels. (watch it here)

An important focus is set on education and training activities. During the first 9 months of the project, CHIC has been working to design the training tools for teenagers. CHIC project was presented at Madrid- Researchers Night, where the chicory root and the sweet extract were exhibited. SENSUS shipped to IDC the chicory roots and the sweet extract made by SENSUS from Chicory. More than 300 people (teenagers, university students, researchers) attended to the conference and around 30 people tasted the bitter chicory root and the sweet extract.

Presentations of IDC in the European Researchers Night- Spain and exhibition of CHIC Project in the European Corner (28th- 29th of September 2018).

CHIC has been presented in several events. EPSO recommended CHIC as positive example for SAG engagement at different fora, such as Plants for the Future ETP General Assembly, EPSO Board and General Meeting and SDG workshop, ESA research WG meeting.

IBISS team members, Dr Jovana Petrović and Marija Smiljković, have presented the CHIC project at European Researchers' Night 2018, held in Belgrade, September 28th - 29th. The presentation was set at "European Corner". They have presented beneficial effects on human health of chicory plants and chicory products which are available at local markets (coffee substitute etc). They also explained the visitors the main goals of the project.

Exhibition of CHIC project at the European Researchers Night- Serbia (28th- 29th of September 2018).

The Managerial Perspective

From a managerial perspective, a general CHIC meeting schedule for every 9 months has been set up, as well as an internal Intermediate Reporting schedule, alternating with the 18-month formal Periodic Reports to the EU.

During the consortium meetings held in January and November 2018, a stakeholder advisory group meeting was organized. Several representatives from all groups (science, industry, consumers, farmers) attended the meetings where interesting discussions happened between the consortium and the advisors.

Project meeting held in November 2018 at KEY GENE Premises, Wageningen, The Netherlands.

CHIC consortium and stakeholder advisory group.

Thanks!

Contacts:

PROJECT COORDINATOR

Dirk Bosch (dirk.bosch@wur.nl)

Stichting Wageningen Research (WR)

EXPLOITATION, DISSEMINATION AND COMMUNICATION OFFICER :
Macarena Sanz (msanz@idconsortium.es)
IDconsortium

EC PROJECT OFFICER:
Carmen de Vicente Coll (carmen.de-vicente-coll@ec.europa.eu)
European Commission Officer DG for Research and Innovation

Follow us on social networks

Twitter: @H2020_CHIC
Facebook: H2020 CHIC PROJECT
Linkedin: CHIC project
Visit our website: www.chicproject.eu

WAGENINGEN UNIVERSITY & RESEARCH

KeyGene

IPB Leibniz Institute of Plant Biochemistry

Université de Lille

Plant & Food RESEARCH
RANGAHAU AHUMĀRA KAI

JKI Julius Kühn-Institut
Federal Research Centre for Cultivated Plants

JOANNEUM RESEARCH

VTT

TU Graz
Graz University of Technology

FONDAZIONE EDMUND MACH

ИБИСС Синиша Станковић
Институт за биолошка истраживања
Универзитет у Београду
πάντα ρει

A ROYAL COSUN COMPANY
SENSUS

iBET

Art Science Node

ID consortium

epso