

International Research Team Releases Genome of Biofactory Plant for Fighting the COVID-19 Pandemic

An international team of scientists, led by the Queensland University of Technology and funded by the European Union NEWCOTIANA H2020 project, is releasing a chromosome-level assembly of the genome of the plant *Nicotiana benthamiana* to public and private laboratories, who intend to use it for the production of biopharmaceuticals directed against the SARS-COV-2 virus.

The virus has caused the largest and most deadly pandemic since the 1918 Spanish flu. A large number of public and private research groups are working around the clock to develop protein-based diagnostic reagents and vaccines for fighting the pandemic. One major problem, once these reagents are developed, is their rapid production in bulk and at a low cost. A possible answer to this problem is to use plants as biofactories. Plant biofactories can be grown in large amounts using simple agricultural technologies, that are within reach of developing countries that lack sophisticated protein production methods, such as those using animal cell cultures. This discipline is known as “molecular farming”.



Nicotiana benthamiana is a plant closely related to tobacco, that has been extensively used in molecular farming, for the production of a wealth of biopharmaceuticals, such as the well-known Zmapp antibody cocktail used in experimental Ebola therapy. In order to optimize production, researchers in the Newcotiana project aim to modify endogenous genes of *Nicotiana benthamiana*, so that the biopharmaceuticals are produced in high amounts and are more similar to those produced in human cells. Thus, a detailed knowledge of the *Nicotiana benthamiana* genome is necessary for optimizing molecular farming using this plant. The scientists involved in the sequencing of the genome are now sharing their findings with other researchers in the field as well as companies developing COVID-19 vaccines and diagnosis reagents.

“Obtaining a high quality genome sequence of *N. benthamiana* is a necessary prerequisite for understanding and optimizing the genes that control the quantity and quality of biopharmaceutical compounds produced through molecular farming” declared Prof. Peter Waterhouse, who leads the team at the Queensland

University of Technology and has coordinated the research; “today, we are releasing the genome sequence to all teams working on fighting the COVID-19 pandemic, in the hope that this will accelerate the discovery of new biopharmaceuticals and, eventually, the fight against this nasty virus. Of course, as is customary when unpublished data are made freely available, we hope these teams will keep us updated on their progress using our sequence and will respect our priority in publishing a full analysis of this genome”.

“The NEWCOTIANA project, funded by the EU, is using gene editing in *N. benthamiana* as a tool for the production of useful biopharmaceuticals” added Dr. Diego Orzaez, staff scientist at the CSIC and Coordinator of the project; “when we started the project two years ago, SARS-COV-2 was not on the radar; however, since the onset of the pandemic, several teams in the project have started working on the production of biopharmaceuticals useful against the pandemic”.

“We will continue to support the project in developing viable economic business cases and marketing strategies for potential products from the work carried out by the research teams” concluded Mr Louis Notley, head of the Neutral Supply Chain team, one of the work package leaders in the project; “Naturally, we very much hope that the addition of this most pressing of targets will make a significant contribution to the fight against COVID-19”.

The *N. benthamiana* genome sequence will be accessible on <https://nbenth.com>.

More information on the NEWCOTIANA project can be found on <https://newcotiana.org/>.