

Tobacco benefits health with new plant breeding techniques

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Dunhill Early Morning Pipe Tobacco, 1990's Murray. Credit: Sjschen/Wikipedia

Researchers at the John Innes Centre are helping to lead a new European Union-funded project that promotes tobacco plants as organic mini factories producing vaccines and new drugs.

The laboratory of Professor George Lomonosoff will help deliver the

NEWCOTIANA project which combines several new plant breeding techniques to produce medical and cosmetic products in [tobacco plants](#).

The 7.2 million Euros Horizon 2020 project aims to develop new varieties of tobacco and its wild relative *Nicotiana benthamiana* to produce compounds such as antibodies, vaccines and drugs in a sustainable manner.

NEWCOTIANA is coordinated by scientists at the Institute for Plant Molecular and Cellular Biology (IBMCP) from the Spanish Research Council (CSIC) with participation of 19 industrial and academic partners from 8 European countries and Australia.

In helping to deliver the project Professor Lomonosoff will lead researchers at the John Innes Centre, Norwich Research Park, in investigating the performance of new varieties of *N.benthamiana* as hosts for transient expression of biopharmaceuticals.

"We will breed new varieties of tobacco and *Nicotiana benthamiana* that will work safely and efficiently as biofactories." explains Professor Lomonosoff.

"Plants will be used as production platforms for molecular farming to harvest high value medical substances," he adds.

Tobacco (*Nicotiana tabacum*) is a crop used to produce cigarettes. With overwhelming scientific evidence that smoking is harmful, even major cigarette companies are now committed to end smoking.

Tobacco [plants](#) can, however, also be used for other purposes that are beneficial for health. Instead of drying the leaves to make cigarettes, researchers have found promising New Plant Breeding Techniques (short: NPBT) to turn tobacco leaves into efficient plant factories for

medical, pharmaceutical and cosmetic products.

The same is true for the leaves of *Nicotiana benthamiana*, a dwarf tobacco relative from Australia which is especially suited for indoors production of bio-pharmaceuticals.

Plants will be bred to produce vaccines, antibodies, and other health-promoting substances including anti-aging or anti-inflammatory compounds.

The cutting-edge NPBTs include CRISPR gene-editing, which offers unprecedented opportunities for crop breeding. Another NPBTs that researchers will apply are modern forms of grafting, or infiltration for temporary gene expression.

By taking advantage of NPBTs, NEWCOTIANA is expected to contribute to revive the traditional cultivation of [tobacco](#), creating new applications that are good for health, and revitalizing rural areas in decline with high-value products in line with the European Knowledge-Based Economy.

"The consortium will carry out experiments to assess the efficiency and safety of NPBTs, providing the industry, policy makers and consumers with experimental evidence that facilitate the decision-making process on the adoption of NPBTs in Europe. " adds Diego Orzaez from CSIC, coordinator of the NEWCOTIANA project. "NEWCOTIANA's scientific aims are ambitious, and in addition to solving a number of technical issues we realize that also need to take into account regulatory requirements and start a dialogue with stakeholders and the general public."

Provided by John Innes Centre

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