

Genetically modified tobacco plants as an alternative for producing bioethanol

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Tobacco, a high-density crop which is mown several times throughout its cycle, can produce as much as 160 tonnes of fresh matter per hectare and become a source of biomass suitable for producing bioethanol. As Jon Veramendi, head of the plant Agrobiotechnology research group, explained, "tobacco plants as a source of biomass for producing bioethanol could be an alternative to traditional tobacco growing which is in decline in the USA and in Europe because it cannot compete with emerging countries like China".

In the course of the research, which has been echoed by the journal *Molecular Breeding*, [tobacco plants](#) of the Virginia Gold and Havana commercial cultivars have been grown. The plants were genetically modified to increase their production of starch and sugars, which contributes to the increase in ethanol production. The basis of this work is the PhD thesis by Ruth Sanz-Barrio, read at the NUP/UPNA last year. The researchers Imma Farrán, Jon Veramendi, Alicia Fernández-San Millán, María Ancín and Luis Larraya have participated in this work.

As Prof Veramendi explained, "what has been done now is fieldwork with these two tobacco cultivars and it has been found that the starch and sugars in the tobacco leaf are in fact higher." Traditional tobacco growing allows the plant to develop and the leaves to grow and get bigger, as the nicotine is synthesised when the plant is more mature. However, if the plants are used for producing biofuels, the researchers go for a higher-density crop similar to that of forage crops: "the tobacco plants are sown very close to each other and various mowings are made

throughout the cycle. When the plant has grown to a height of about 50 cm, it is cut and the output is taken to the biomass processing factory. That way, it is possible to obtain up to 160 tonnes of matter per hectare over the whole cycle ".

What is more, when the tobacco is integrated into a biorefinery, it is possible to extract interesting by-products like proteins (they constitute up to 30% of the dry weight of the plant and are nutritionally more complete and have a greater protein efficiency rate than those from cow's milk or soya, so they could be used to feed humans or animals), solasanol (used to produce vitamins E and K) and xanthophylls (an additive in chicken feeds).

Over the last ten years, the surface area devoted to tobacco growing has been cut in Europe by 45%. In Spain, the main tobacco-growing area is Extremadura, followed by Andalusia. The researchers consider that one of the alternatives to the traditional use of tobacco could be to produce biofuel. From now on, high-density cultivation tests will need to be carried out to see whether the results obtained in the fieldwork, where the cultivated surfaces are very small, are confirmed.

Provided by Elhuyar Fundazioa

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