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Jojoba oil biorefinery: Production of biodiesel and antiviral compounds

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The needs for the growth and development of the world population are rising and in a not so far future are going to exceed the capacity of our fossil raw materials, not only for energy production as fuels but also as the basis for the chemical products needed for life the way it is known nowadays. The current target of the Chemical Industry is to replace fossil raw materials by renewable ones, eliminating hazardous and contaminant processes, producing environmental compatible products (biodegradable) developing a Green and Sustainable Chemistry, not only for the production of Biofuels from renewable raw materials but also for the replacement of a large number of industrial use products. This is possible due to the use of Third Generation Biorefineries which allows obtaining biofuels as well as a large range of bioproducts of fine chemistry as well as commodities and pharmaceutical products. Jojoba (*Simmondsia chinensis*) is a perennial shrub that is native to the Mojave and Sonoran deserts of Mexico. Currently, the production of the shrub is usually in the United States, Central and South America, South of Africa, and Israel. Also, it could be possible the cultivation in some semidesertic areas like Canarias Island, Almería and Aragón. Jojoba is able to grow in extreme climatic conditions and, therefore; its cultivation is appropiate in arid and even in saline lands. The structure of its pivotal root prevents the erosion and that is why Jojoba has a big value as desertization controller and regenerative landscapes. Jojoba is unique in that the lipid content of the seeds. Jojoba oil is not a triglyceride, but a mixture of long chain esters (97–98 wt.%) of fatty acids and fatty alcohols. The fatty acid component of jojoba wax esters primarily consists of eiconenoic, erucic, and oleic acids with cis-11-eicosen-1-ol, cis-13-docosen-1-ol and cis-15-tetracosenol principally composing the alcohol component. This work is presented within the ideas formerly exposed and it is included in the EU's Framework Programme. The products obtained in this biorefinery are:

- Unsaturated alcohols from Jojoba oil which present pharmacological activity within the antivirals group.
- Monoalkylic Esters of the Jojoba acids, with applications as solvents, biolubricants or dielectric liquids.
- Second Generation Biodiesel. Jojoba oil does not compete with edible oils.

For obtaining these products based on 3rd Generation Biorefineries the processes that are used take in account the principles of Green Chemistry and Sustainable. The optimization of these processes will be developed for its industrial scale-up and the required physical properties for its characterization as pharmaceutical use products, biodiesel, biolubricants, biosolvents, cosmetics, food additives, and biodegradable dielectric liquids will be measured. From jojoba oil alcohols a new family of compounds have been developed and used successfully to inhibit growth of enveloped virus. Influence virus (Insituto Nacional de Investigación y Tecnología Agraria, INIA, Gustavo del Real) and HIV (Instituto Carlos III, ISCIII, José Alcamí) have been used to check the effectiveness of these compounds. The mechanism of action suggests that they could be used against other enveloped virus as Hepatitis C (HCV).