

## First2run: flagship demonstration of an integrated biorefinery for dry crops sustainable exploitation towards biobased materials production

**Andrea Vassoi<sup>a</sup>, Tommaso Tabanelli<sup>a</sup>, Francesca Digioia<sup>b</sup>, Fabrizio Cavani<sup>a</sup>**

<sup>a</sup>Dipartimento di Chimica Industriale "Toso Montanari", Università degli studi di Bologna  
Viale del Risorgimento, 4, 40136, Bologna

<sup>b</sup>Novamont S.p.a., Via Fauser, 8, 28100, Novara  
e-mail: andrea.vassoi2@unibo.it

The role of University of Bologna team, a partner of the Flagship First2Run project, is focused on the study of the catalytic process for the transformation of fatty esters (triglycerides) and fatty acids into shorter dicarboxylic acids, more specifically the oxidative cleavage of oleic acid (or the corresponding triglyceride), from cardoon flower, into Pelargonic acid and Azelaic acid (or the corresponding ester). These acids are industrially used as component in a series of applications such as polyamides, polyesters, cosmetics, pharmaceuticals, plasticizers, lubricants, or hydraulic fluids (Figure 1)<sup>[1]</sup>.

This process is currently carried out in industry with ozone as the oxidant, which however implies the use of dangerous process conditions. Matriza, a joint venture between Versalis and Novamont, has developed a process for the oxidative cleavage in two-steps, consisting first in an hydroperoxidation of the triglyceride to the corresponding glycol and then in the oxidative cleavage of the glycol into the shorter chain acids<sup>[2]</sup> (Figure 1). Aim of my research work will be to investigate various options for the catalytic oxidation of fatty acids and esters, by means of more sustainable oxidants and catalysts. For example, one option will be the design and implementation of a heterogeneous catalyst for the oxidative cleavage step.

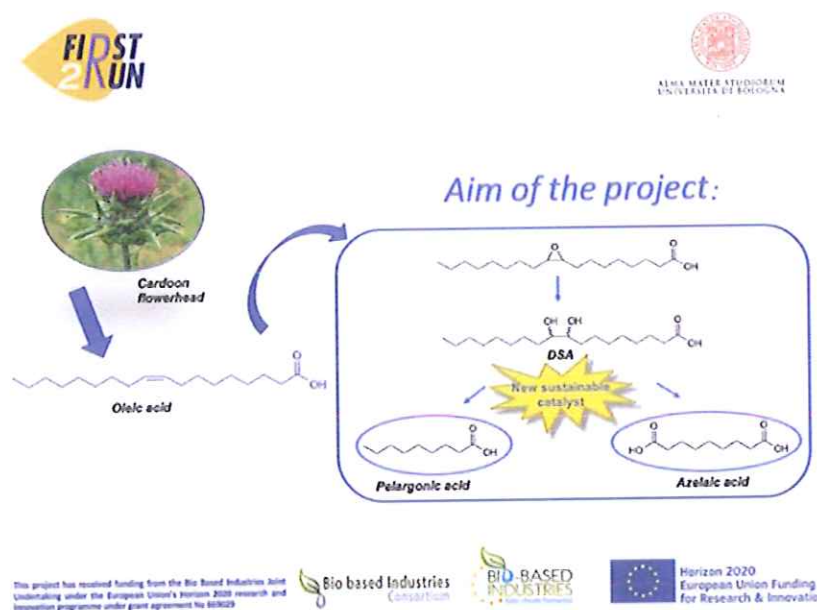


Fig. 1: Main reaction pathways for the cleavage of Oleic acid to Azelaic acid and Pelargonic acid.

### References

- [1] Ullmann's Encyclopedia of Industrial Chemistry, Release, 7th Edition, Wiley-VCH, Weinheim 2010.  
[2] Bastioli C., Milizia T., Borsotti G., US Patent 0245995 (2008)

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