ENERGY CROPS for zero waste biorefineries in the Mediterranean region

Efthymia Alexopoulou

Center for Renewable Energy Sources and Saving – CRES. 19th Km Marathonos Avenue 19009 Pikermi Attikis, Athens, Greece. Email: ealex@cres.gr

According to the European research project 4FCROPS (www.4fcrops.eu) energy crops include: a) Oil Crops (sunflower, rapeseed, Ethiopian mustard, etc.), b) Fibre Crops (hemp, flax, kenaf, etc.), c) Lignocellulosic crops (giant reed, switchgrass, miscanthus, cardoon, etc.), d) Short rotation forestry (willow, poplar, eucalyptus, etc.) and e) Sugar crops (sweet sorghum, sugar beets, etc.). The main driving forces for cultivation of energy crops are the growing need for: a) starch and sugar plant species as source for bioethanol production, b) biodiesel, aviation biofuels and biochemicals from oil crops, c) solid biomass to obtain heat and electricity, either directly through combustion or indirectly through conversion for use as fuels, and d) biogas from energy/biomass crops. The development of biorefinery processes (the sustainable processing of biomass to a spectrum of marketable products and energy) is an absolute necessity and it is the key to meet this vision towards bio-based economy that includes the: a) use the available biomass as efficiently as possible and with the lowest environmental impact, b) energy consumption, c) manufacturing costs and CO_2 footprint, d) redefinition of the transformation routes, and e) the change in products specifications according to the new processes performances and limitations. Biorefineries can use various combinations of feedstock and conversion technologies to produce a variety of products. Most of the existing biorefinery concepts produce biofuels and a relatively small fraction is used for chemistry and chemical products that have a higher added value. The benefits of an integrated biorefinery are mostly based in the diversification in feedstocks and marketable final products. For the Mediterranean region quite important energy crops are: sunflower, cuphea, safflower, castor, kenaf, flax, nettle, hemp, giant reed, switchgrass and sweet sorghum.