Cardoon as a multipurpose energy crop: Opportunities and challenges

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Cardoon (*Cynara cardunculus* L.) is a perennial herb of the Asteraceae family, native to the Mediterranean region. Due to its great adaptation to Mediterranean climates and its outstanding growth this plant species has been proposed as an energy crop in dry-farming of the region. In this presentation the state-of-the art of the cardoon energy crop was made. Strategies of adaptation to Mediterranean conditions, cultivation system as an energy crop, crop management techniques, biomass yields, crop produce, applications, properties of cardoon solid biofuel, seed oil and biodiesel, cynara lignocellulose pulping, pharmacologically active compounds and rosette potential as green forage were explained. From the knowledge gained so far, opportunities and challenges have been identified. Main opportunities are: Mediterranean crop, suitable for dry-farming, perennial herb with annual growth cycle, very low biomass moisture content and multipurpose crop for industrial and energy purposes. Challenges identified were: plant breeding, biomass quality, yield variability, harvest mechanization and pest control. In conclusion, cardoon has been proved to be a versatile crop in dry-farming of the Mediterranean region (rainfall 350-450 mm) and a number of applications have been identified. The development of cardoon as an energy crop (field crop) is under way though much knowledge has been gained in the past decades regarding its potential as an energy crop. The biorefinery concept can be applied to cynara: lignocellulosic plant fractions for solid biofuels, oil seeds for biodiesel and residues for nutraceutics. Some important topics to research are plant protection, dedicated varieties, crop mechanization and field yields.