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## Recent progress and future prospect in using the biomass of the perennial grass *Miscanthus x giganteus* for renewable energy generation

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Global challenges like climate change and ecosystem degradation coupled with a growing demand for food, feed and energy, impose to find more sustainable alternatives of producing and consuming, mostly based on increasing the share of renewable sources of energy in the main economy sectors. The alternative of using some plant species which are carbon-neutral and are producing energy biomass in high quantities became very attractive at present, due to the contribution to decrease the use of fossil fuels and of the dependence on foreign energy sources. The ideal biomass energy crops must efficiently use available resources, are perennial, store carbon in soil, have high water use efficiency, have low fertilizer requirements and are not invasive. *Miscanthus x giganteus* possesses all these characteristics and produces large amounts of biomass. Genus *Miscanthus* with its several species is a rhizomatous C4 perennial grass, native to South - eastern Asia. *Miscanthus x giganteus* is a triploid sterile hybrid of *M. sinensis* and *M. sacchariflorus* and was firstly cultivated in Europe in horticultural settings, but since 1983 has been widely studied both in Europe and the US as a promising energy crop. The remarkable adaptability of *Miscanthus x giganteus* to different environments, including marginal land not suitable for cultivation of the major crops,

made this novel energy crop to be established and distributed under a range of European and North-American climatic conditions. Even when is burned in conventional steam power plants *Miscanthus* biomass has a considerably lower GHG intensity than coal and natural gas when used for electricity generation, thus contributing significantly to climate change mitigation. Besides, *Miscanthus* is described as a candidate of a wide range of applications within the emerging concept of biorefinery, for producing bioethanol, for thermochemical valorization, for cleaning the soils polluted with heavy metals, and for producing biocomposites to be used as ecological building materials. The purpose of this study is to describe the experience gained up to now in Europe and in the US with *Miscanthus x giganteus* cultivation in different environments and with its biomass valorization, and to highlight the researches that are underway, focused on further improvement of management practices, breeding of new genotypes, especially suitable for marginal conditions, development of new utilization options, meant to recommend *Miscanthus x giganteus* as a key biomass energy crop, with an important role in sustainable production of renewable fuels.

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