

Effects of sustainable agronomic management in giant reed for biomethane production

Piccitto^{a*}, A., Iurato^a, A., Ciaramella^a, B.R., Cosentino^a, S.L., Testa^a, G.

^a Dipartimento di Agricoltura, Alimentazione e Ambiente (Di3A), University of Catania, Via Valdisavoia 5, 95123 Catania, Italy, *alessandra.piccitto@phd.unict.it

Keyword(s): *Arundo donax* L.; lignocellulosic biomass; long-term plantation, anaerobic digestion; biomethane; white rot fungi; fungal pretreatment

In recent years, lignocellulosic perennial grasses have been increasingly attracted as a feedstock to produce biomethane through anaerobic digestion, considered a sustainable energy solution for reaching the RED II directive's aims.

Arundo donax L., commonly known as giant reed, is a lignocellulosic perennial rhizomatous grass, diffused in the Mediterranean area. Among different perennial grasses, *Arundo donax* L. is a promising candidate for bioenergy production because of its ability to thrive in a wide range of environmental conditions, also in marginal areas with low agronomic inputs (use of irrigation, fertilizers, and pesticides). Lignocellulosic material from perennial grasses can be converted into several biofuels and by-products through different biochemical or thermochemical processes. Anaerobic digestion is one of the most environmentally friendly technologies to produce biomethane from lignocellulosic material, however adopting lignocellulosic biomass as substrate a pretreatment is necessary to break down the tough structure, weakening cellulose crystallinity and increasing the surface area for enzymatic attack. Among pretreatment methods, the biological one is the most sustainable since it is a mild process that doesn't use chemical reagents and doesn't require high energy, cost, and equipment inputs.

This study aimed to evaluate the long-term yield of *Arundo donax* in the semiarid Mediterranean environment in relation to harvest time and nitrogen fertilization and its biomethane production using a fungal pretreatment.