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Maralfalfa grass: Synergies with biogas plants and potential as bioenergy and biorefinery crop

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Maralfalfa (*Pennisetum spp.*) is a Poaceae family forage grass used as livestock feedstock in Latin America, but its popularity is growing worldwide. The origin of Maralfalfa grass is still unclear but it is likely to be of *Pennisetum violaceum* (Lam.) rich exsper or a hybrid (*Pennisetum hybridum*) *Pennisetum americanum* between L. and *Pennisetum purpureum*. Like all *Pennisetum* grasses, it reacts very positively to nitrogen and organic fertilization. Several cultivars have been established in Spain, associated to agroindustrial biogas plants located in Vall d'Uixó (Castellón) and Los Alcázares (Murcia), with rows of Maralfalfa of 15 m length, planted with two canes in parallel 0.10 m deep. The planting frame was 0.75 m between plants. Those plants have been fertilized with different amounts of digestates coming from the biogas plants. The doses of fertilization were adjusted to 80, 170 and 340 kg of Nitrogen per hectare and year. The average productions of dry matter per hectare have been 40, 55 and 59t of DM of biomass, with an average content of water of the harvested material in 82.5%. It was made three harvests per year. The level of crude protein reached 17.2%, very much dependent on the age of each harvest. On parallel, several biogas tests have been performed, leaving yields of biogas between 520 and 600 l of biogas per kg of volatile solids. This positive relation between the yields of biomass generated per hectare and the use of the surplus digestates from waste management biogas plants reveals with extraordinary potential. On the energy field, the potential of methane generation reaches 18.200 Nm³ per hectare, compared to the 9.000 Nm³/ha of maize silage and 8.000 Nm³/ha of sorghum. On the sustainability and economical fields, the enormous reduction of fertilizer costs and the recycle of agrifood waste originated Nitrogen into vegetable protein and tissue opens many areas of development of this application. Biorefinery and bioethanol projects might also benefit from this synergic relationship between biogas plants and Maralfalfa plantations.

Biography

Luis Puchades Rufino is an Agricultural engineer and currently the Managing Director of Ludan renewable energy and biogas operation Spain. He was Director of the Spanish branch of Biogas Nord AG (Germany), a German listed company (BG8:) and one of the pioneers and largest biogas companies in the world, from 2006 to 2009. In 2010 he founded a company called Biovic to run agricultural businesses (corn, elephant grass), trading of raw materials and waste management. He had been involved in the development, design, construction and operation of more than 40 biogas projects. His areas of interest include conversion of waste to energy, waste to food and waste to fertilizers. He also has more than 20 publications and research articles.

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