

Título: APLICACIÓN DE LODOS DE DEPURADORA EN EL CULTIVO DE ALFALFA PARA SU UTILIZACIÓN COMO BIOCOMBUSTIBLE DE SEGUNDA GENERACIÓN. EFECTOS DE LA SEQUÍA SOBRE EL DESARROLLO Y LA ASIMILACIÓN DE NITRÓGENO

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Fecha de lectura: 25/06/2012

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Descriptores:

> FISILOGIA VEGETAL

> FIJACION BIOLOGICA DEL NITROGENO

> BOTANICA

El fichero de tesis no ha sido incorporado al sistema.

Resumen: Sewage sludge application is considered as one of the most economical disposal methods for reusing as nitrogen fertilizer on agricultural lands. However, the presence of potentially toxic compounds and metals in sludge involves potential risks due to presence of contaminants and heavy metals that can be absorbed by plants. Alternatively, sewage sludge can be used to fertilize bioenergy crops, which eliminates the potential for food chain contamination. Therefore, the aim of this work was to study the effects of sewage sludge on plant development, physiology and efficiency of symbiotic association between alfalfa and *Sinorhizobium meliloti* to evaluate if sewage sludge can be applied to produce crops that, in turn, can be used in the production of biofuel as a renewable fuel source. Experiments were performed in a greenhouse and included three treatments: (1) plants inoculated with rhizobia and amended with sewage sludge; (2) plants inoculated only with rhizobia; and (3) non-inoculated plants fed with ammonium nitrate. Two levels of irrigation were imposed: (1) well-watered and (2) drought stress. Results show that sewage sludge application did not affect nodulation ability of plants but data provide evidence for inhibition of efficiency of nitrogen fixation, which is characterized by decreased nodule enzyme activities involved in carbon and N metabolisms. Under drought, sludge-treated plants had increased plant growth, and higher photosynthetic and water use efficiencies than untreated plants. Drought

stimulated nitrate reductase and glutamine synthetase/glutamate synthase activities suggest that under drought, cooperation of both nitrogen fixation and nitrate assimilation pathways in sludge-treated nodules could aid to alleviate negative effects of drought on plant-bacteria symbiosis. Moreover, under drought, the stems of plants grown with sewage sludge had higher concentrations of fermentable carbohydrates and cellulose than mineral fertilized plants. This study provides new data supporting the use of sludge sewage in agriculture, recycling the organic waste at low costs without harming the crop and avoiding potential risks to animal and human health that they may provoke.