

# EFFECTS OF NITROGEN NUTRITION ON BIOMASS PRODUCTION OF *TYPHA DOMINGENSIS* (PERS.) STEUDEL TO BIOETHANOL PRODUCTION

M. Carhuacho, P.L. Aguado, M.D. Curt, J. Fernández  
 Agro- Energy Group. Universidad Politécnica de Madrid (UPM-Spain)

## PURPOSE OF THE WORK

*Typha domingensis* Pers. Steudel (commonly known as cattail) has a great capacity to remove nutrients from eutrophic water, mainly nitrogen; thus, it has been used in constructed wetlands for wastewater treatment. Moreover, *Cattail* can be used for the production of starchy rhizomes which are easily fermentable to bioethanol. However, few studies have addressed the issue of *Typha*'s requirements to enhance the production of biomass or the interactions between the level of nutrients and the cattail ecotype for biomass production. Therefore, the aim of this paper was to determine the effect of nitrogen on biomass production of different ecotypes of hydroponically grown *T. domingensis*.

## MATERIALS AND METHODS

### Origin of the ecotypes of *T. domingensis*:



Puebla de Alcocer, Badajoz (5°26'W, 38°99'N); Olmedilla del campo, Cuenca (2°69'W, 40°06'N) and Lantejuela, Seville (5°22'W, 37°35'N).

### Experimental design:

- A two-factor randomized experiment.
- Three ecotypes (Ba, Cu, Se).
- Five N levels (Treatments T0-control=0 mg·l<sup>-1</sup>; T1=20 mg·l<sup>-1</sup>, T2=50 mg·l<sup>-1</sup>, T3=100 mg·l<sup>-1</sup> and T4=200 mg·l<sup>-1</sup>).

### Experimental conditions and sampling:

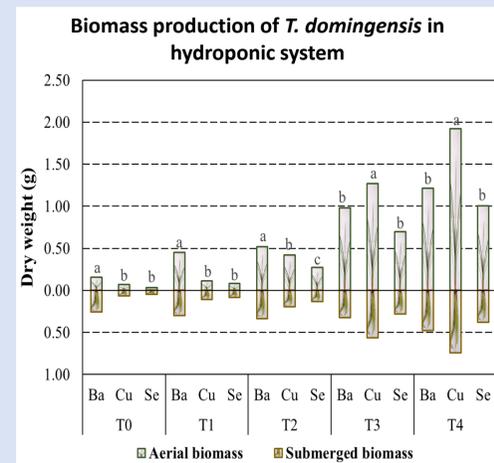
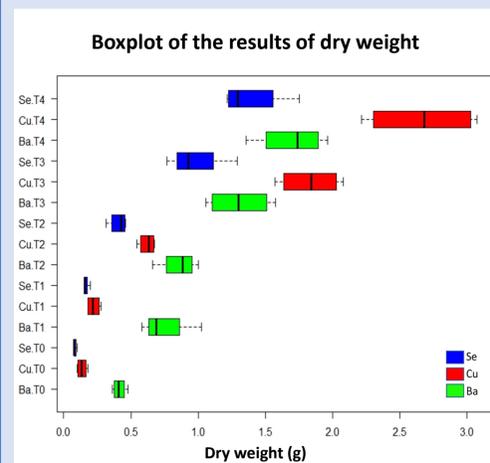
Evaluation of plant growth:

- Biomass dry weight.
- Biomass partitioning.
- Total leaf length.
- Total roots length.

**Analytical method:** Nitrogen content (TN) by the Kjeldahl method

**Statistical analysis:** Two-way analysis of variance (ANOVA)

## RESULTS



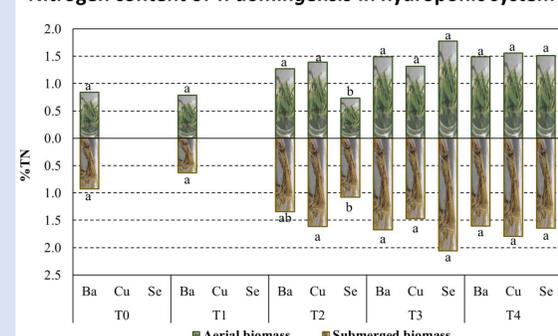
Mean values of total leaf and roots length of *T. domingensis* plantlets (ecotype from Badajoz)

Treatment	Total leaf length (cm)	Total roots length (cm)
T0	81.50±26.70c	47.50±9.71a
T1	113.75±26.91bc	36.50±12.06b
T2	156.25±26.89b	18.75±1.70c
T3	237.85±31.71a	18.25±0.95c
T4	245.65±28.27a	16.25±0.95c

Growth of *T. domingensis*, ecotype from Badajoz.



Nitrogen content of *T. domingensis* in hydroponic system



## CONCLUSIONS:

Results from this work showed that higher N availability promoted more growth of *T. domingensis* plants grown in a hydroponic system, but that the response of the ecotypes studied was different. The production of both aerial and submerged biomass increased with nitrogen. N content of the biomass was always higher in the submerged biomass than in the aerial biomass. Among the ecotypes studied in this work, the ecotype that performed best in low-N conditions was the one from Badajoz, whereas the best ecotype in high nutrient conditions was the ecotype from Cuenca. Further research is needed to model the growth of each ecotype.