

# **WP2**

## **Adaptability and Productivity Field Trials**

**Partner (7)**

**Faculdade de Ciências e Tecnologia**

**Universidade Nova de Lisboa, Portugal (FCT/UNL)**

*Task 2.2 – Effect of different sowing dates and plant populations on biomass yields*

*Task 2.3 – Effect of irrigation and nitrogen fertilization on biomass yields*

### **Scientific team:**

**Prof. Santos Oliveira**

**Dr<sup>a</sup> Ana Luisa Fernando**

**Dr<sup>a</sup> Maria Paula Duarte**

**Eng. João Morais**

**Eng<sup>a</sup> Ana Catroga**

**Dr<sup>a</sup> Gorete Serras**

### **Visitors:**

**Dr. Salvatore Pizza,**

**Dip. Di Produzione Vegetale, Univ. della Basilicata, Potenza, Italy**

**Dr<sup>a</sup> Valentina Godovikova, Institute of Cytology, Russian Academy of Sciences, Novosibirsk, Russia**

## ***Significant difficulties and delays experienced during the reporting period***

### ***Preparation of fields***

1<sup>st</sup> field prepared adequately, but due to the construction of a new building, and to the movement of trucks we had to find another field.

### ***2<sup>nd</sup> field***

Prepared in the beginning of May. For task 2.2, 1<sup>st</sup> date of sowing 23<sup>rd</sup> May.

On the 29<sup>th</sup> May, another problem. This time with the water pipes.

After a lot of bureaucracy, we had water in the fields on the 26<sup>th</sup> June. S<sub>1</sub> in task 2.2 was sowed again. In this 1<sup>st</sup> year of experiments sowing dates were too late.

## ***Weather***

### ***The heat***

in the last week of July and the first two weeks of August, average temperatures were 36°C and the plants stop growing.

At the same time the rabbits come out and start eating the plants. Together with the rabbits we had also moles, blind rats, cats.

After the heat wave, we had a succession of heavy rain intermediated with hot temperatures, even in October.

## *Task 2.2 – Effect of different sowing dates and plant populations on biomass yields*

**2 sowing dates   x   2 varieties   x   2 plant densities   x   3 replicates**

**S<sub>1</sub>: 27/6/2003  
S<sub>2</sub>: 11/7/2003**

**V<sub>1</sub>: Tainung 2  
V<sub>2</sub>: Everglades 41**

**D<sub>1</sub>: 20 plants/m<sup>2</sup>  
D<sub>2</sub>: 40 plants/m<sup>2</sup>**

**Each field: 8 x 5 m<sup>2</sup>**

**75 kg N/ha  
120 kg K<sub>2</sub>O/ha  
60 kg P<sub>2</sub>O<sub>5</sub>/ha**

## *Task 2.3 – Effect of irrigation and nitrogen fertilization on biomass yields*

**4 irrigation levels   x   3 nitrogen fertilization   x   3 replicates**

**I<sub>1</sub>: 0% PET  
I<sub>2</sub>: 25% PET  
I<sub>3</sub>: 50% PET  
I<sub>4</sub>: 100% PET**

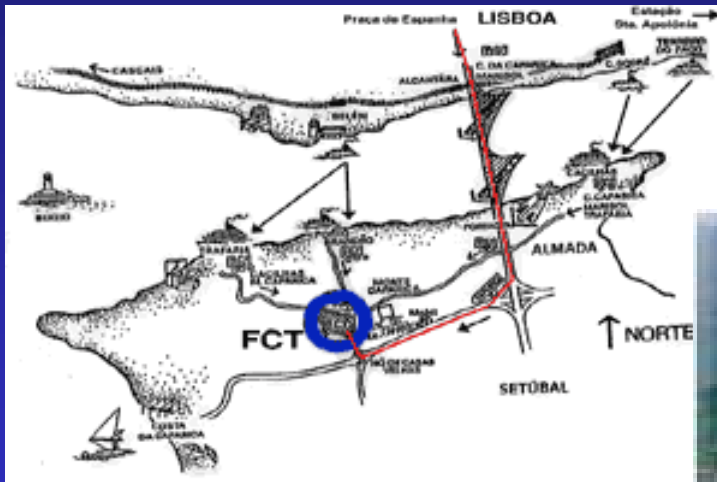
**N<sub>1</sub>: 0 kg N/ha  
N<sub>2</sub>: 75 kg N/ha  
N<sub>3</sub>: 150 kg N/ha**

**Variety: Tainung 2  
Sowing: 4/7/2003**

**Each field: 9 x 5 m<sup>2</sup>  
120 kg K<sub>2</sub>O/ha  
60 kg P<sub>2</sub>O<sub>5</sub>/ha**

## ***Experimental fields***

**Located in Monte de Caparica, in the Peninsula of Setúbal,  
near the University.**



**Fields**



**Latitude: 38° 40' N**

**Longitude: 9° W**

**Altitude: 50 m**

**Urban area near the Atlantic coast**

















## **Soils - sampling before the establishment of the crops – 19/05/2003**

- texture – clay                      - bulk density –  $1.3 \text{ kg.dm}^{-3}$
- pH (H<sub>2</sub>O) –  $8.6 \pm 0.1$       - pH (KCl) –  $7.6 \pm 0.1$
- Electrical conductivity –  $0.19 \pm 0.00 \text{ mS.cm}^{-1}$
- Organic matter content -  $1.6 \pm 0.2 \%$
- CaCO<sub>3</sub> -  $8 \pm 1 \%$
- N Kjeldahl –  $0.25 \pm 0.01 \%$  (N)
- NO<sub>3</sub> –  $0.8 \pm 0.1 \text{ mg(N).Kg}^{-1}$  - NO<sub>2</sub> -  $0.04 \pm 0.01 \text{ mg(N).Kg}^{-1}$
- NH<sub>4</sub> –  $1.4 \pm 0.1 \text{ mg(N).Kg}^{-1}$
- Extractable phosphorus -  $111 \pm 2 \text{ mg(P).Kg}^{-1}$
- Total phosphorus -  $680 \pm 40 \text{ mg(P).Kg}^{-1}$
- Exchangeable K -  $230 \pm 20 \text{ mg(K).Kg}^{-1}$
- Total potassium –  $6.0 \pm 0.3 \text{ g(K).Kg}^{-1}$



# Plants

## *Task 2.2 – Effect of different sowing dates and plant populations on biomass yields*

**50% emergence – 4 days after sowing, as for S<sub>1</sub> as for S<sub>2</sub>, as for  
Tainung 2 as for Everglades 41**

**Tainung 2 - 90% of the seeds emerged  
Everglades 41 – 85 % of the seeds emerged**

**After 108 days (13<sup>th</sup> October) after S<sub>1</sub> sowing  
no flowering,  
maybe due to the late sowing and to  
the decline in temperatures**

**Maturity was not yet achieved.**

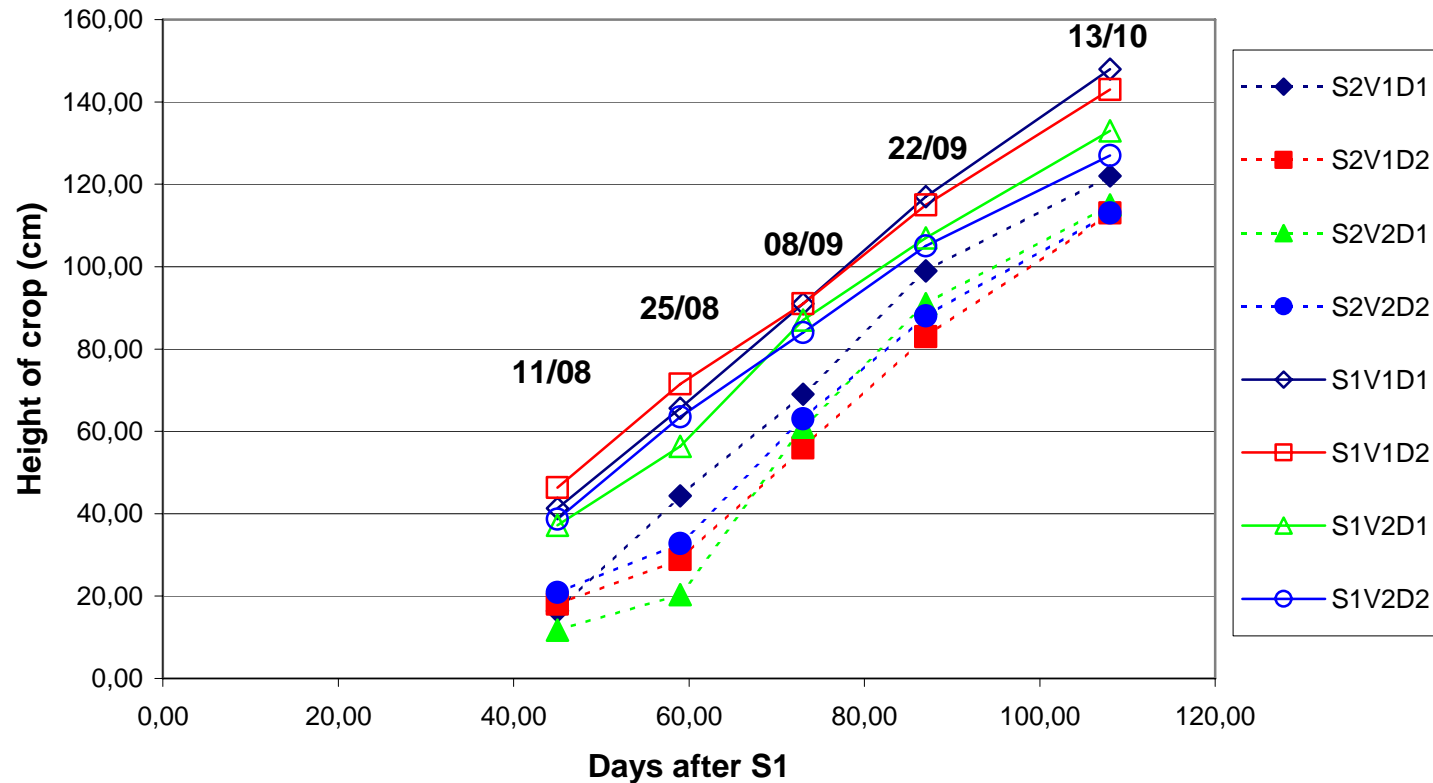


**Plants with 15 days after sowing**

**Everglades 41, 40 plants.m<sup>-2</sup>**



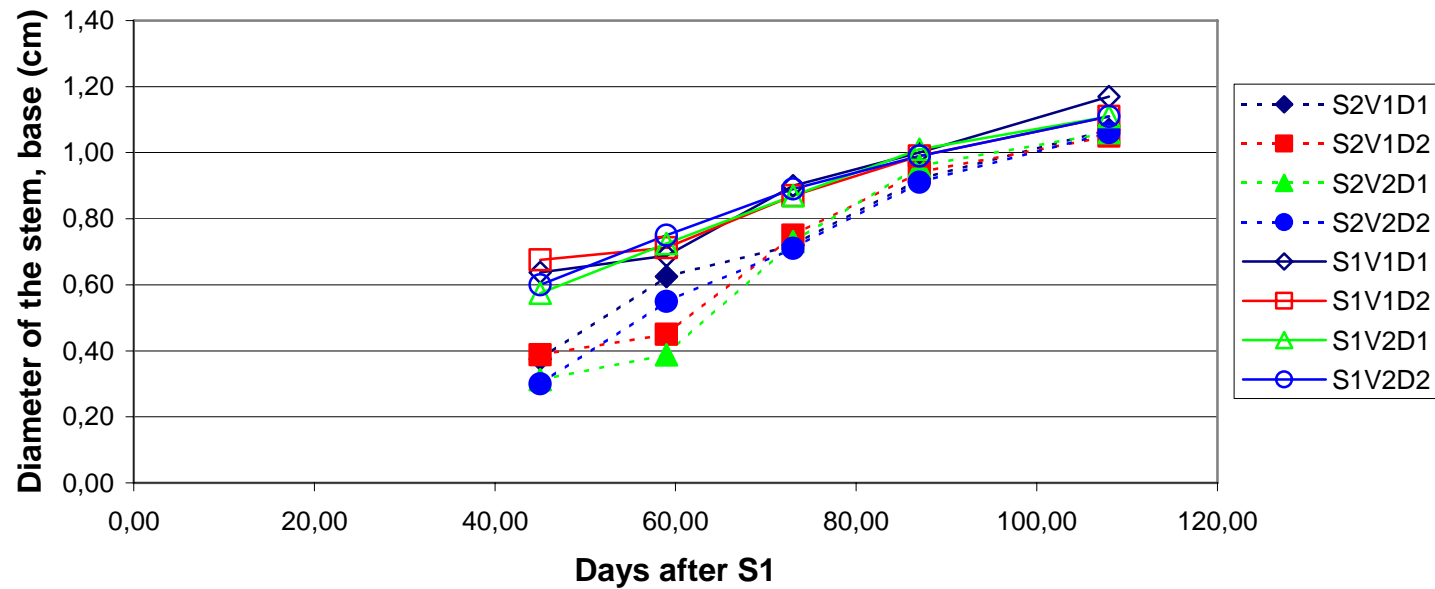




**Significant differences between  $S_1$  and  $S_2$ ,  $S_1$  higher than  $S_2$ .**

**Tainung 2 is higher than Everglades 41, but the differences are not significant.**

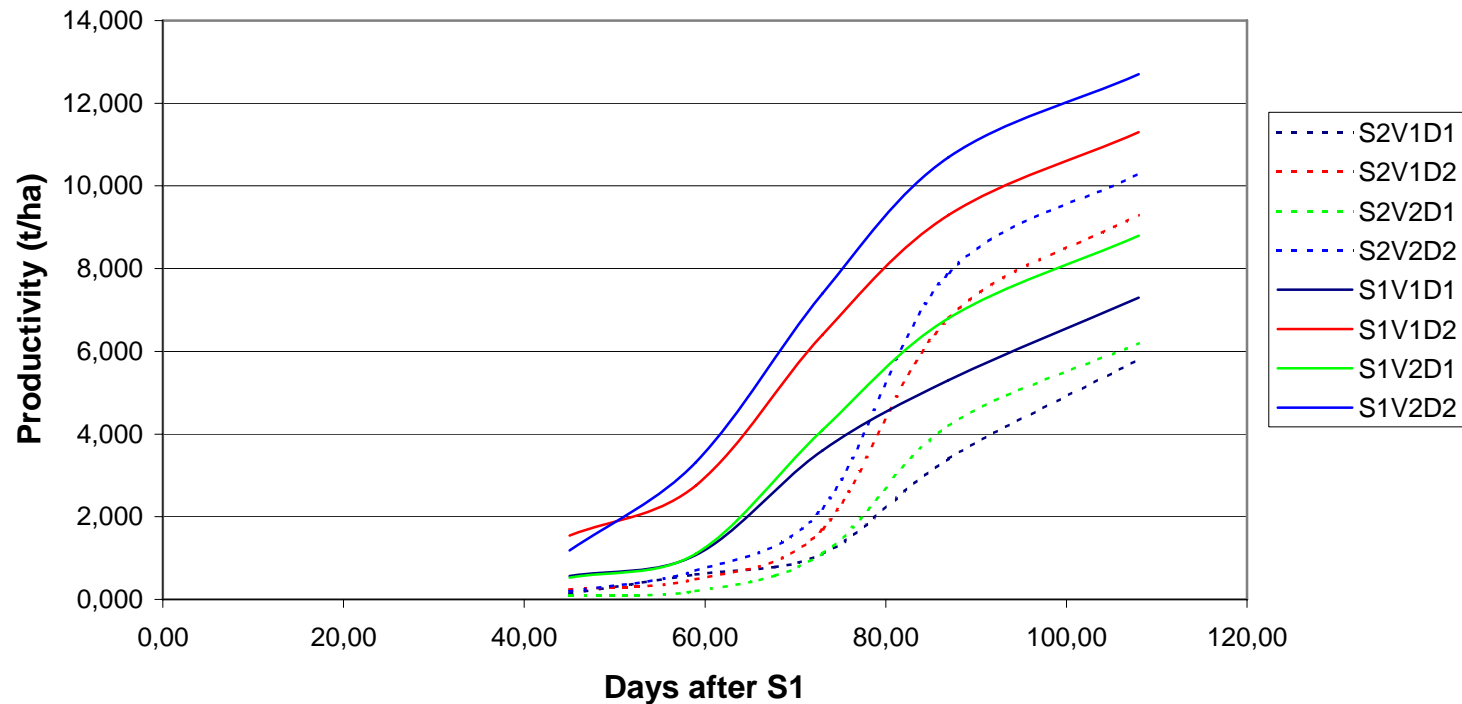
**Fields with 40 plants.m<sup>-2</sup> are lower than 20 plants.m<sup>-2</sup>, but the differences are not significant.**



**$S_1$  higher than  $S_2$ , but differences were only significant at early stages of growing.**

**No significant differences between varieties and densities.**





**Everglades 41 is more productive than Tainung 2.**

**Fields with 40 plants.m<sup>-2</sup> more productive than with 20 plants.m<sup>-2</sup>.**

**S<sub>1</sub> fields more productive than S<sub>2</sub>.**

**Bark, 20-25% total; Core, 45-50% total; Leaf+sec. Stem, 30%, approximately**

## ***Task 2.3 – Effect of irrigation and nitrogen fertilization on biomass yields***

**50% emergence – 5 days after sowing**

**90% of the seeds emerged**

**After 90 days (2<sup>nd</sup> October) after sowing**

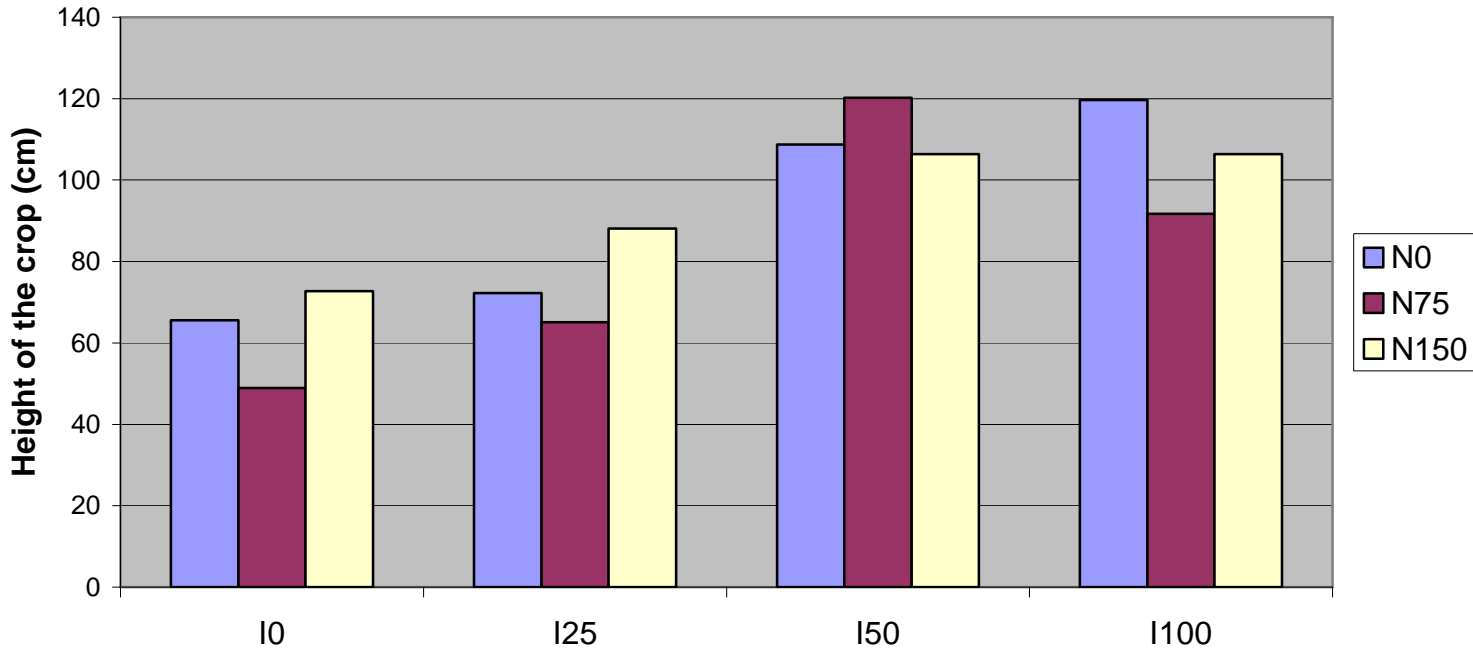
**no flowering,**

**maybe due to the late sowing and to**

**Maturity was not yet achieved.**

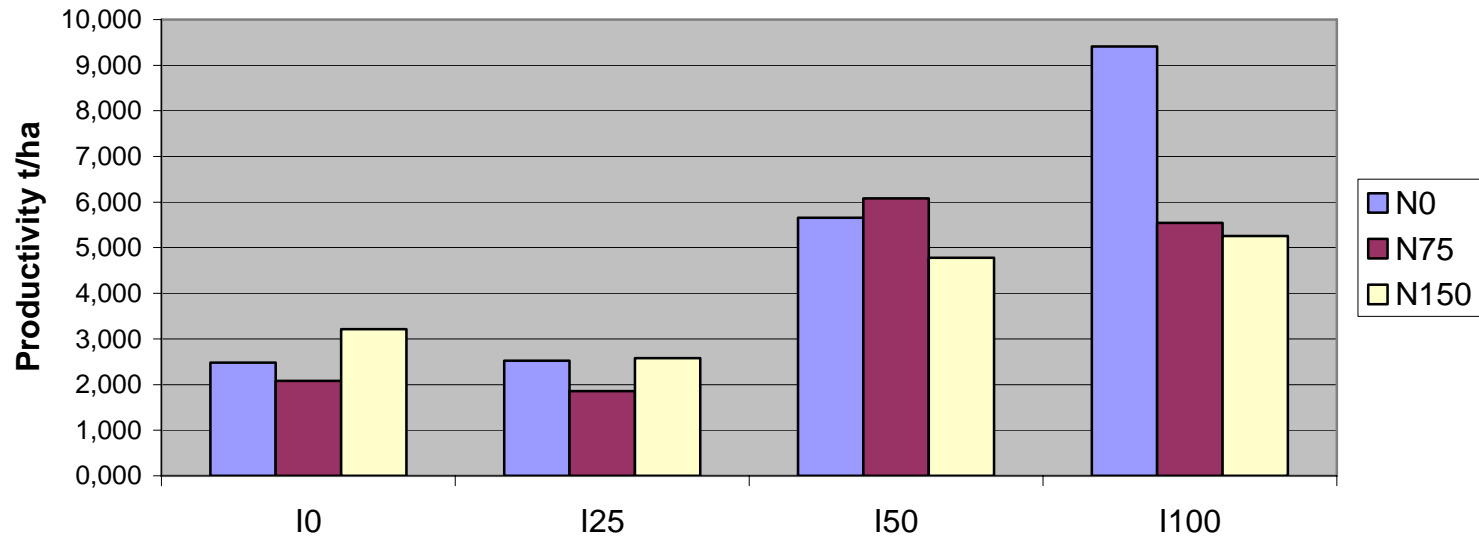
**Different levels of irrigation were applied after 14th August  
(41 days after sowing)**





**At 90 days after sowing, 2nd October, there are differences in the height of the crop between levels of irrigation, but they are not significant**

**There are no significant differences between levels of nitrogen, probably because the soil was rich in nitrogen**



**At 90 days after sowing, 2nd October, there are significant differences in the productivity of the crop between levels of irrigation**

**There are no significant differences between levels of nitrogen, probably because the soil was rich in nitrogen**

***Special thank to the field workers:***



***Ana***

***Salvatore***

***Gorete***