

PROJECT TITLE

Genotypic differences in grain number determination of bread and durum wheat under water and/or nitrogen stress

CONSORTIUM

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SUMMARY OF THE REPORT

Our main interest was on tillering capacity and its relationships a) with early vigour (EV) b) main stem fertility, and developmental processes.

a) Our interest towards the relationship between EV and tillering is focused on their impact on the number of spikes per unit area in both bread and durum wheat, two species characterized by a different tillering capacity. This experiment was aimed at establishing whether EV is involved in the genotypic variability in wheat tillering capacity, and to analyze the relationships between EV and tillering traits once removed the effect of cold requirements (through vernalization), and of photoperiodic sensitivity (14 h daylength).

b) Our hypothesis was that the genotypic variability in tillering capacity observed in wheat (bread and durum) is associated to genotypic variability in spikelet number and affected by vernalization. Variation in phyllochron can be involved in spikelet number determination via *eps* genes. For the relationship between phyllochron and spikelet number we'll concentrate with the leaves emerged before the onset of stem elongation (TS) to exclude the effect of leaf number on phyllochron.

Phenoarch gave us the possibility to have a precise control of all environmental variables plus soil water availability. Together with the vernalization treatment imposed, this allowed us to eliminate all the limits to the processes of growth and development. At the same time the 'drought treatments' were projected in such a way to impose the same level of drought on all the genotypes compared, regardless of their leaf area development.

The many traits directly measured in great detail twice a week represent a powerful data-set on which the information acquired by imaging could be calibrated for future experiments. Moreover, the integration between direct measurements and image-acquired data could be a way to: i. quantify the specific contribution to plant leaf area development of main stems vs tillers by subtracting to the plant leaf area estimated by imaging, the measured main stem leaf area obtained by summing the leaf area of all the leaves produced by the main stem; ii. describe the relationship between developmental rate (quantified via leaf number or Haun stage) and plant leaf area development.