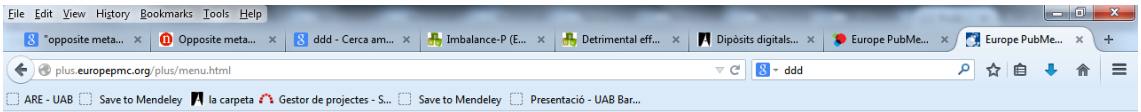

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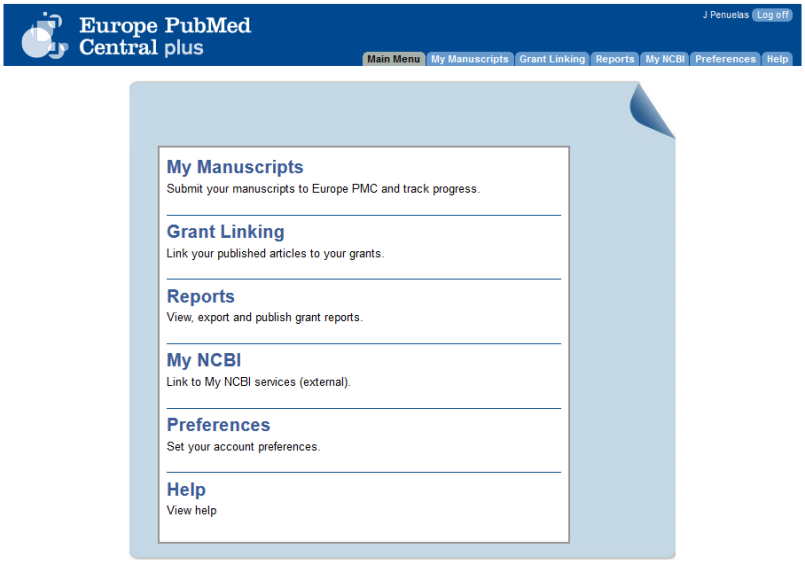

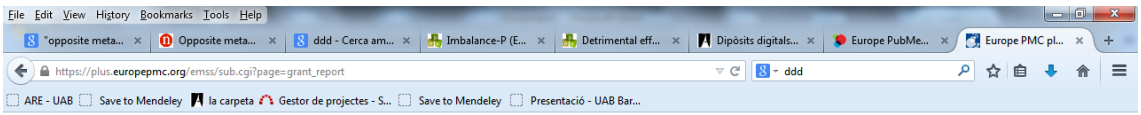

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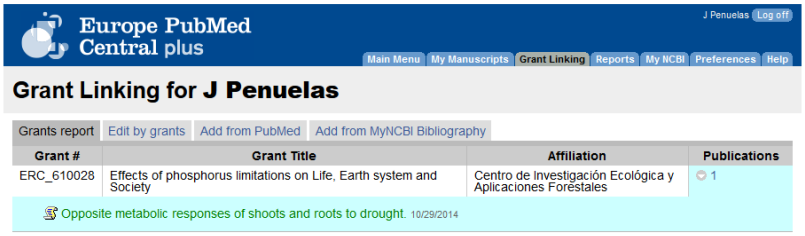

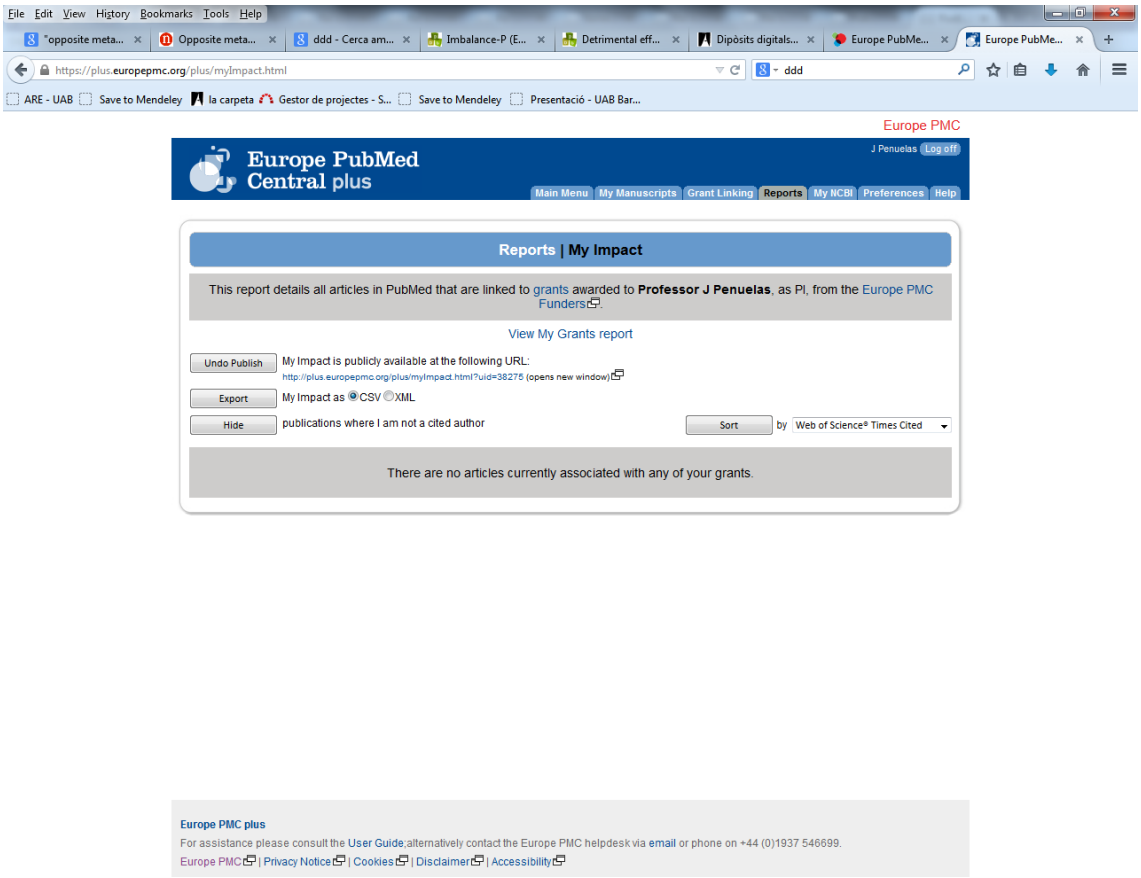
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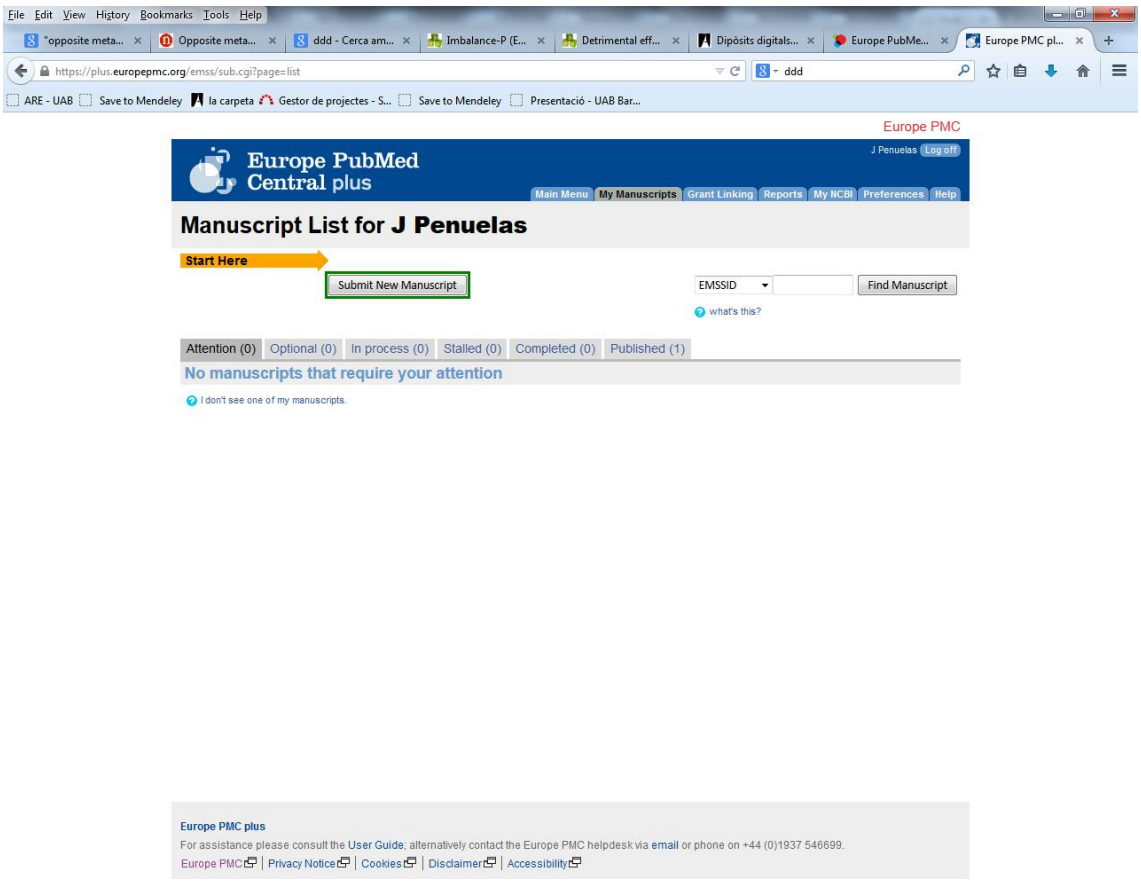
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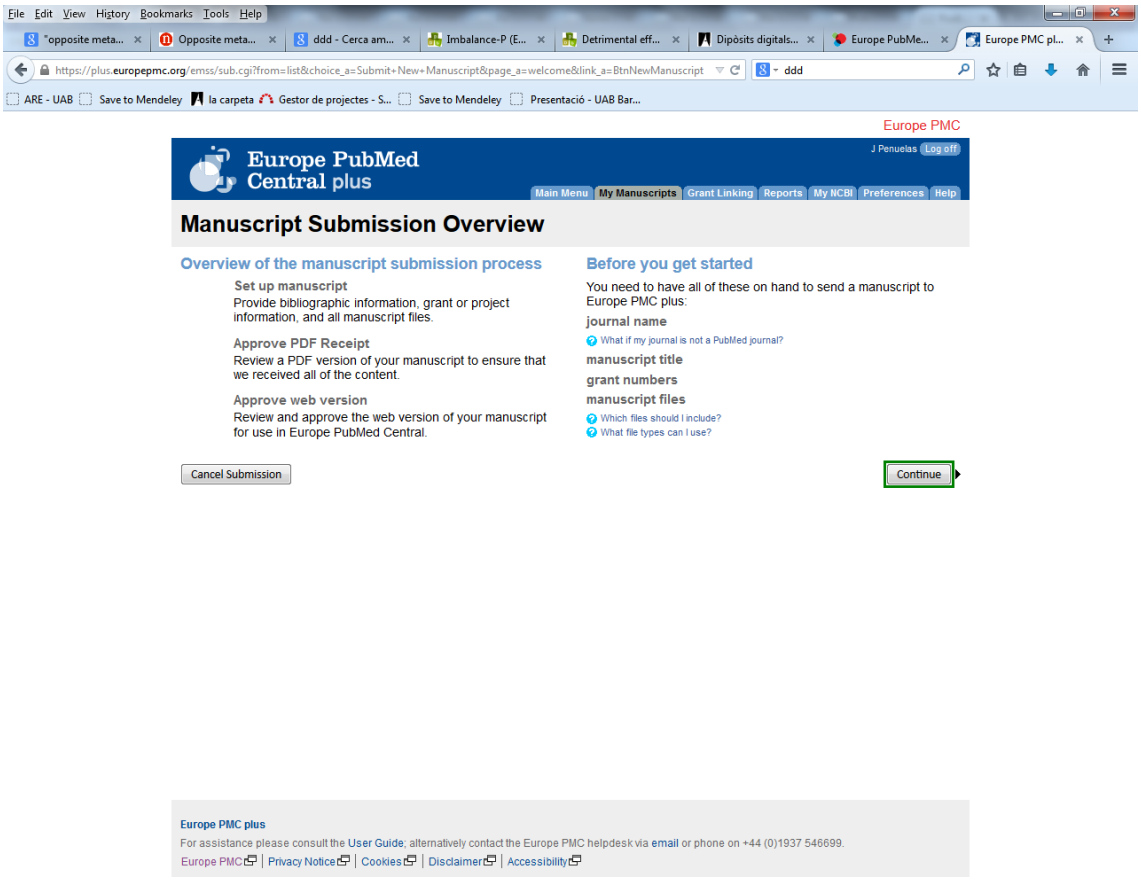
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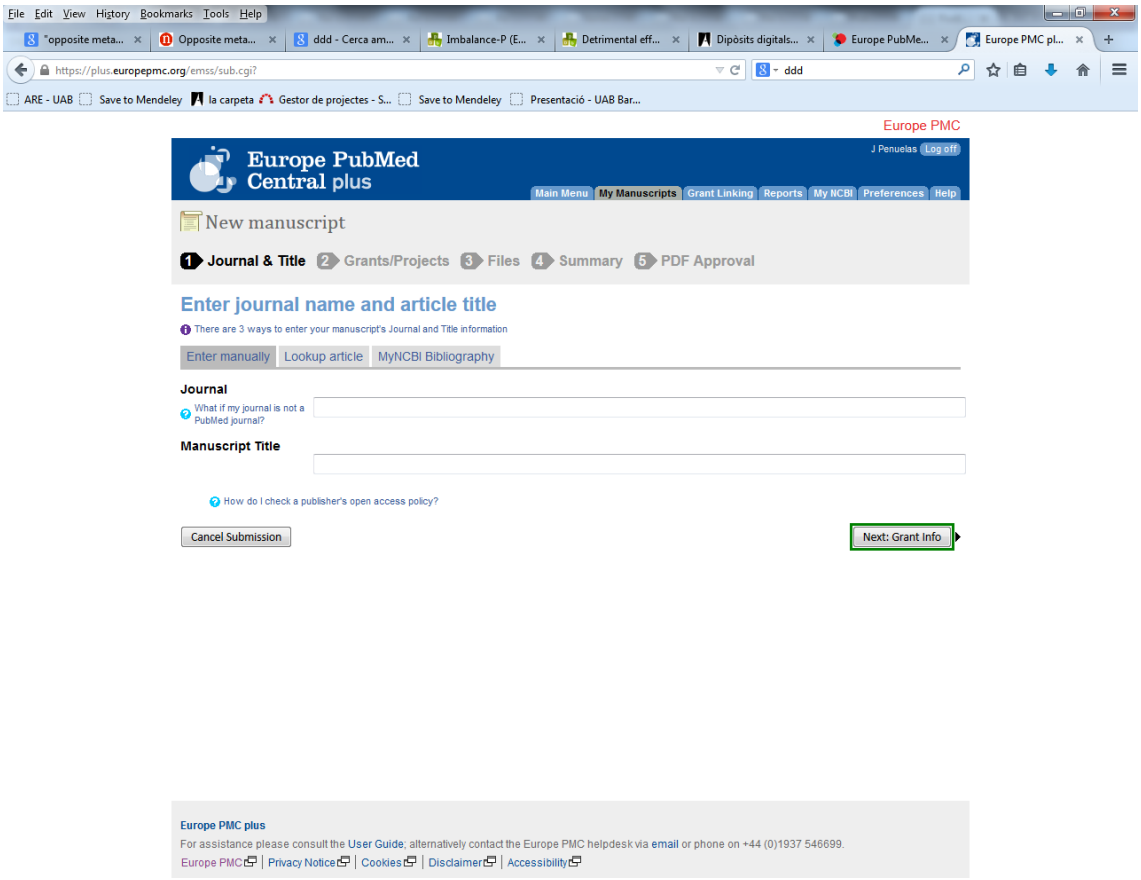
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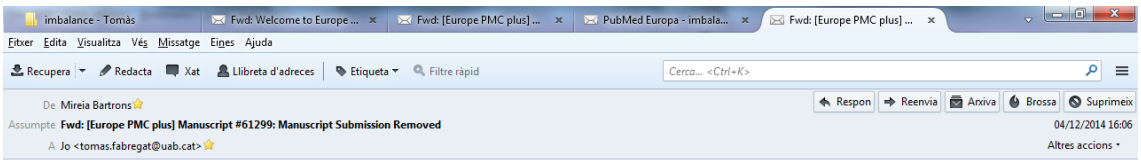

Hola Tomas

També et volia comentar aquest mail que han enviat al Josep. No entenem massa què vol dir ben bé.

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Gràcies

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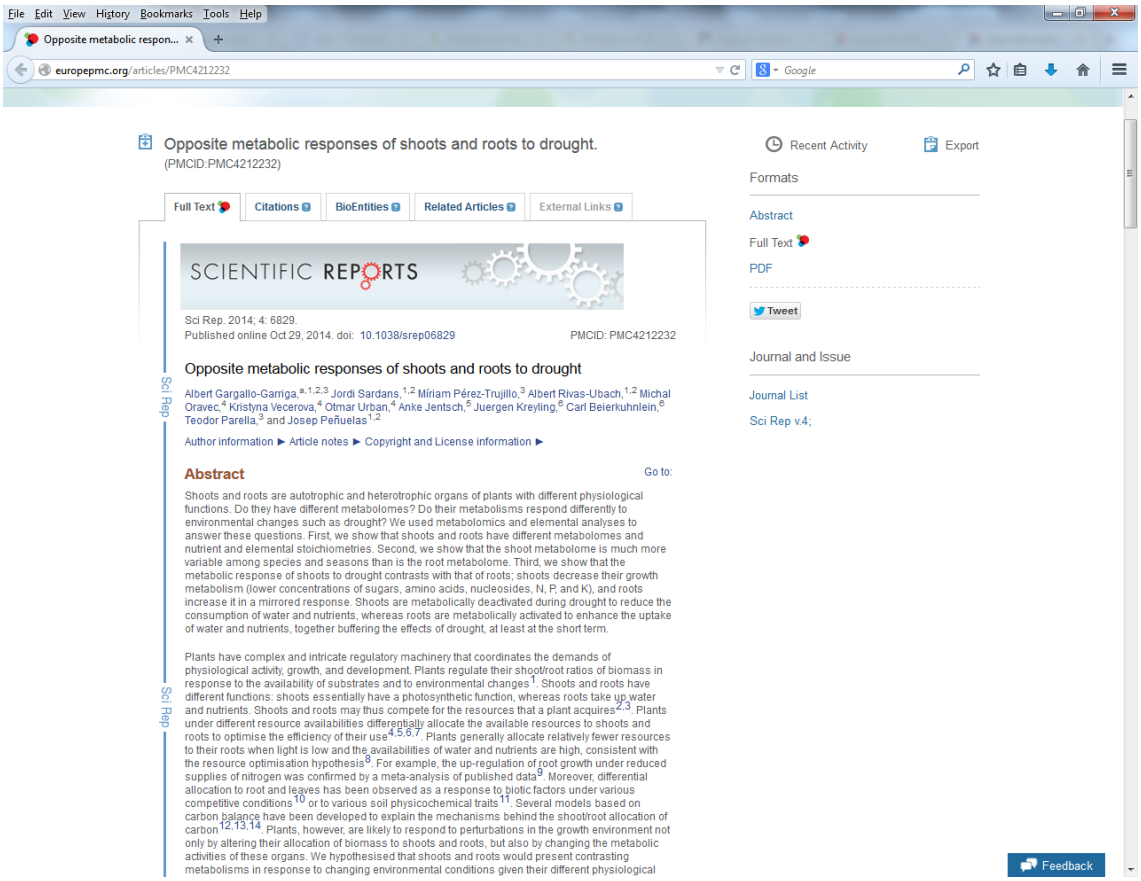

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Opposite metabolic responses of shoots and roots to drought

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Abstract

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Shoots and roots are autotrophic and heterotrophic organs of plants with different physiological functions. Do they have different metabolomes? Do their metabolisms respond differently to environmental changes such as drought? We used metabolomics and elemental analyses to answer these questions. First, we show that shoots and roots have different metabolomes and nutrient and elemental stoichiometries. Second, we show that the shoot metabolome is much more variable among species and seasons than is the root metabolome. Third, we show that the metabolic response of shoots to drought contrasts with that of roots; shoots decrease their growth metabolism (lower concentrations of sugars, amino acids, nucleosides, N, P, and K), and roots increase it in a mirrored response. Shoots are metabolically deactivated during drought to reduce the consumption of water and nutrients, whereas roots are metabolically activated to enhance the uptake of water and nutrients, together buffering the effects of drought, at least at the short term.

Plants have complex and intricate regulatory machinery that coordinates the demands of physiological activity, growth, and development. Plants regulate their shoot/root ratios of biomass in response to the availability of substrates and to environmental changes[1]. Shoots and roots have different functions: shoots essentially have a photosynthetic function, whereas roots take up water and nutrients. Shoots and roots may thus compete for the resources that a plant acquires[2,3]. Plants under different resource availabilities differentially allocate the available resources to shoots and roots to optimise the efficiency of their use[4,5,6,7]. Plants generally allocate relatively fewer resources to their roots when light is low and the availabilities of water and nutrients are high, consistent with the resource optimisation hypothesis[8]. For example, the up-regulation of root growth under reduced supplies of nitrogen was confirmed by a meta-analysis of published data[9]. Moreover, differential allocation to root and leaves has been observed as a response to biotic factors under various competitive conditions[10] or to various soil physicochemical traits[11]. Several models based on carbon balance have been developed to explain the mechanisms behind the shoot/root allocation of carbon[12,13,14]. Plants, however, are likely to respond to perturbations in the growth environment not only by altering their allocation of biomass to shoots and roots, but also by changing the metabolic activities of these organs. We hypothesised that shoots and roots would present contrasting metabolisms in response to changing environmental conditions given their different physiological

Feedback