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Virginia Garofano Gomez, D. Corenblit, Bruno Moulia, J. Steiger, M. Abadi, Patrice Chaleil, A. Evette, O. Forestier, A. Garreau, E. Gonzalez, et al.

[P1.236]

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V. Garófano-Gómez*[1,2], D. Corenblit[1,2], B. Moulia[3], J. Steiger[1,2], M. Abadi[4], P. Chaleil[3], A. Evette[5], O. Forestier[6], A. Garreau[1,2], E. González[7,8], B. Hortobágyi[1,2], F. Julien[7], L. Lambs[7], A. Masip[7], S. Ploquin[3], O. Voldoire[1,2] et al

[1]Université Clermont Auvergne,, France, [2]CNRS, France, [3]INRA, France, [4]Véodis-3D, France, [5]Université Grenoble Alpes, IRSTEA, France, [6]Pépinière Forestière de l'Etat, DRAAF Pays-de-la-Loire, France, [7]Ecolab CNRS, France, [8]University of Denver, Canada

Even though it is well recognised that black poplar pioneer trees are riparian ecosystem engineers which modify their fluvial habitat, e.g. by enhancing sediment accumulation, the below-ground responses of young poplars to hydrogeomorphological constraints are still poorly understood.

We performed a semi-controlled *ex situ* experiment to quantify key functional root traits of response of black poplar cuttings to simulated hydrogeomorphological constraints, i.e. drag force, sediment burial and their combination. The cuttings (n=128) were planted in woven polypropylene bags filled with sandy gravel and with an irrigation system attached, and assigned to one of the four possible treatments (1: drag force; 2: sediment burial; 3: drag force + sediment burial; 4: control). A completely randomized experimental design was employed with cuttings and treatments.

The treatments were applied according to the seasonal occurrence and average duration of floods in the region where the genotype came from. The drag force treatment consisted in the application of three different bending levels on the plant to simulate the drag force exerted during one single flood. A continuous sequence of three floods of one week each was simulated. The sediment burial treatment consisted in the application of a 15 cm-layer of sandy sediment around the main stem to simulate the deposited sediment after a flood event.

A destructive final harvest was performed at the end of one growing season. The below-ground morphology was characterised from manual measurements and image analysis using a trait-based approach. In order to test our hypothesis whether black poplar is able to modulate its phenotype when it is exposed to hydrogeomorphological constraints, we investigated the relationship between the different treatments and the morphology of the root system using directional and multivariate statistics. Our results show some differentiated trends and open up new perspectives for potential applications in bioengineering techniques and river restoration.

Keywords: Populus nigra L., root functional response traits, drag force, sediment burial