Additional figures to article: *Scanner-based minirhizotrons help to highlight relations between deep roots and yield in various wheat cultivars under multi-stress conditions.*

François Postic, Katia Beauchêne, David Gouache and Claude Doussan* (*corresponding author)

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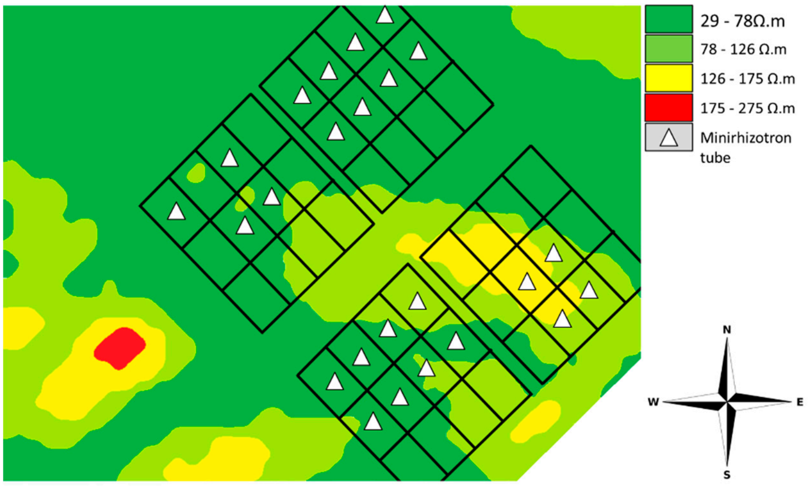

Figure S1. Electrical resistivity (Ω.m) map of the experimental field. Green areas denote low electrical values, and red areas denote high electrical values. Positions of minirhizotron tubes are displayed by white triangles (Δ). Low values of resistivity are related to deeper soils, whereas high values of resistivity are related to shallower soils. Using soil coring samples and minirhizotron depths, the scale relating depth to resistivity is estimated as follows: 29–78 Ω.m = 71–120 cm, 78–126 Ω.m = 40–70 cm, 126–175 Ω.m = 30–40 cm, and 175–275 Ω.m < 30 cm.

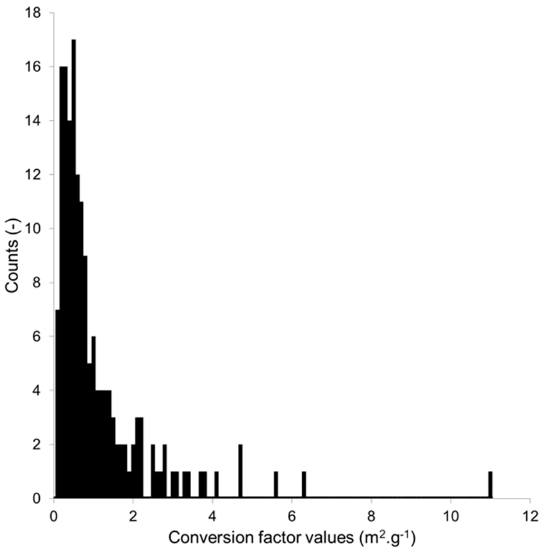

Figure S2. Histogram of the conversion parameter (ε×SRL) to a volumetric root biomass obtained with Eq. 2. The median value of the conversion parameter is $\mu1/2$ = 0.62 m².g^{-1}, leading to a depth of field of view of 3.5 mm by considering a specific root length (SRL) value for winter wheat of to 180 m.g^{-1}.

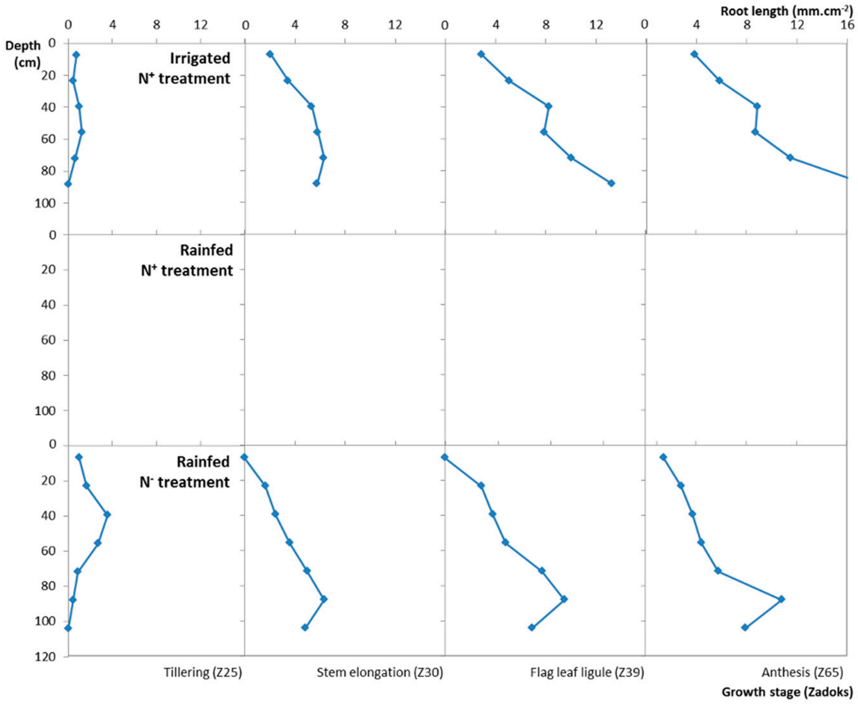

Figure S3. Effect of the Irrigation, Nitrogen (I,N) treatments on the dynamic of the Hystar hybrid bread wheat root length surface density profiles (mm.cm^{-2}) estimated from minirhizotron at different stages. Mean root length surface density profiles of the Hystar wheat cultivar are shown at tillering (Z25), stem elongations (Z30), flag leaf ligule (Z39) and anthesis (Z65) stages. Under the two treatments monitored (optimal and water and nutrient coupled stress), both exhibit a deep rooting profile pattern, optimal conditions peaking at 17.35 mm.cm^{-2} at anthesis (out of figure).

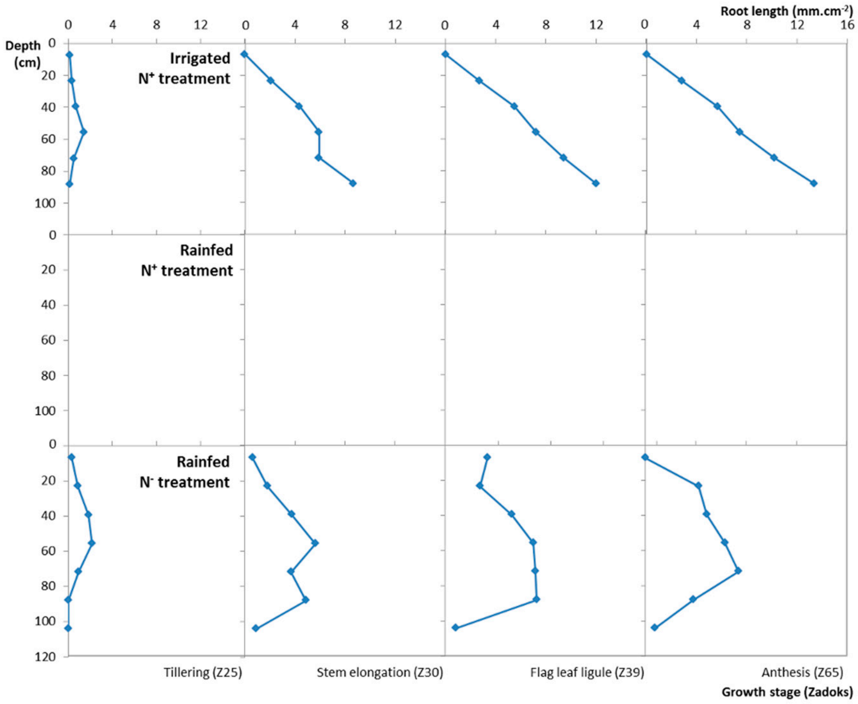

Figure S4. Effect of the Irrigation, Nitrogen (I,N) treatments on the dynamic of the Nogal synthetic wheat root length surface density profiles (mm.cm-2) estimated from minirhizotron at different stages. Mean root length surface density profiles of the Nogal synthetic wheat cultivar are shown at tillering (Z25), stem elongations (Z30), flag leaf ligule (Z39) and anthesis (Z65) stages. Optimal and stressful conditions show contrasted rooting pattern. Under optimal conditions, this synthetic wheat cultivar exhibits a deep root profile, as measured for the bread wheat Apache cultivar. On the opposite, under stressful conditions, the root pattern developed is closer to the durum wheat Miradoux cultivar.

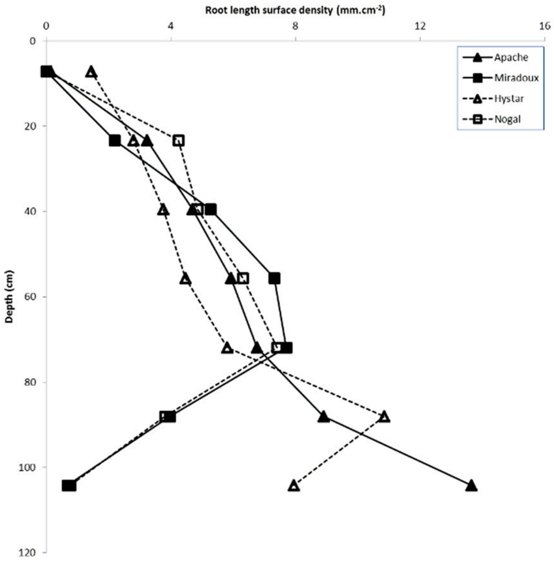

Figure S5. Comparison of the root length surface density profiles obtained with minirhizotron technique at anthesis half-way (Z65) on average for each wheat cultivar under stressful conditions (I-N-). Similarities are found between the rooting profiles of Apache and Hystar cultivars on the one hand, and Miradoux and Nogal cultivars on the other hand. A parallel may be drawn regarding their grain yield in this I-N- treatment: higher yields being obtained by Apache and Hystar cultivars (7.17 t.ha^{-1}, 7.65 t.ha^{-1}, respectively) and lower yields obtained by Miradoux and Nogal cultivars (5.79 t.ha^{-1}, 6.06 t.ha^{-1}, respectively).