



**Supplementary figure 1** Growing condition of hydroponic medium to characterize the genetic variations in root development traits depending on the form and concentration of nitrogen that was available (ammonium or nitrate): in the presence of  $\text{NH}_4\text{Cl}$  or  $\text{KNO}_3$  at concentrations of  $5\ \mu\text{M}$  (nitrogen deficient) or  $500\ \mu\text{M}$  (nitrogen sufficient, representing the soil nitrogen concentration in paddy fields). The hydroponic medium was renewed at 4 and 6 days after seed sowing. The 3rd leaf was developing in almost all accessions in all applications at day 8 after sowing.