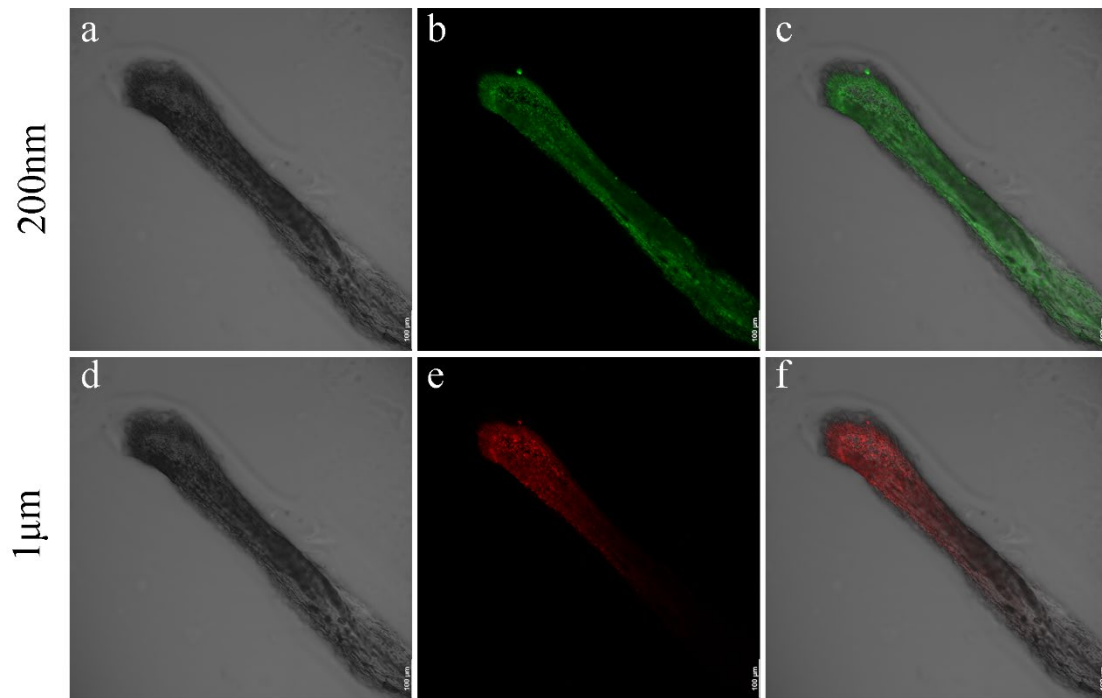


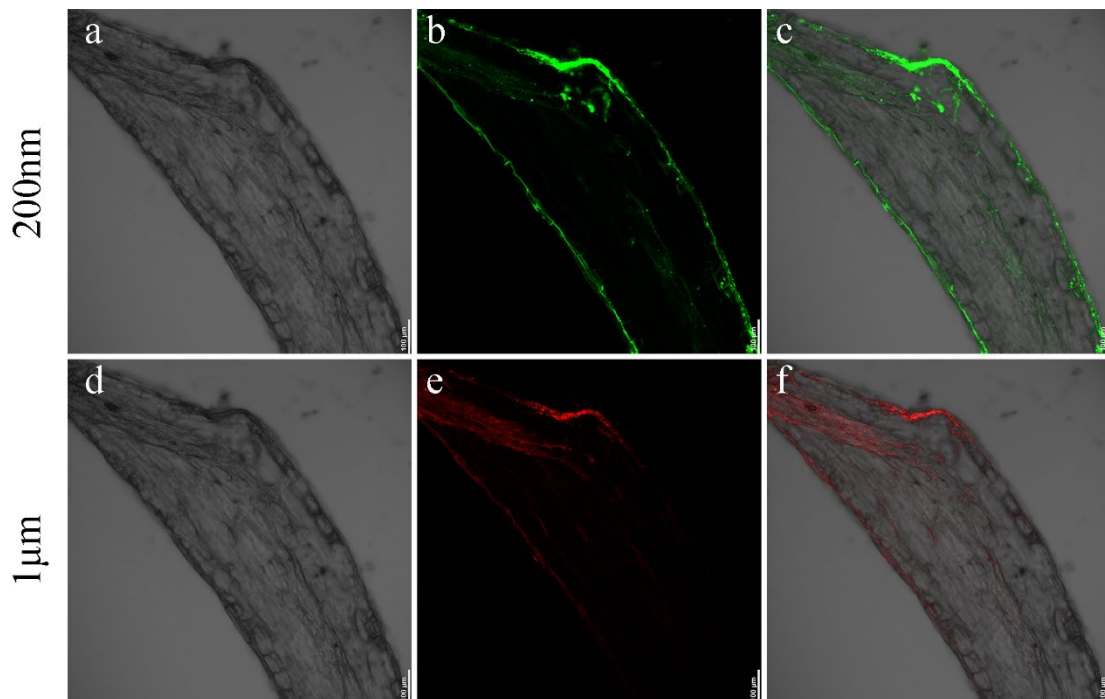
Supplementary Figure S1. Properties and characteristics of polystyrene (PS) beads. a, b Particle size distribution of PS beads. **c** FTIR of PS beads; **d, e** SEM image of 200 nm and 1 μm PS beads. Bars: 1 μm .



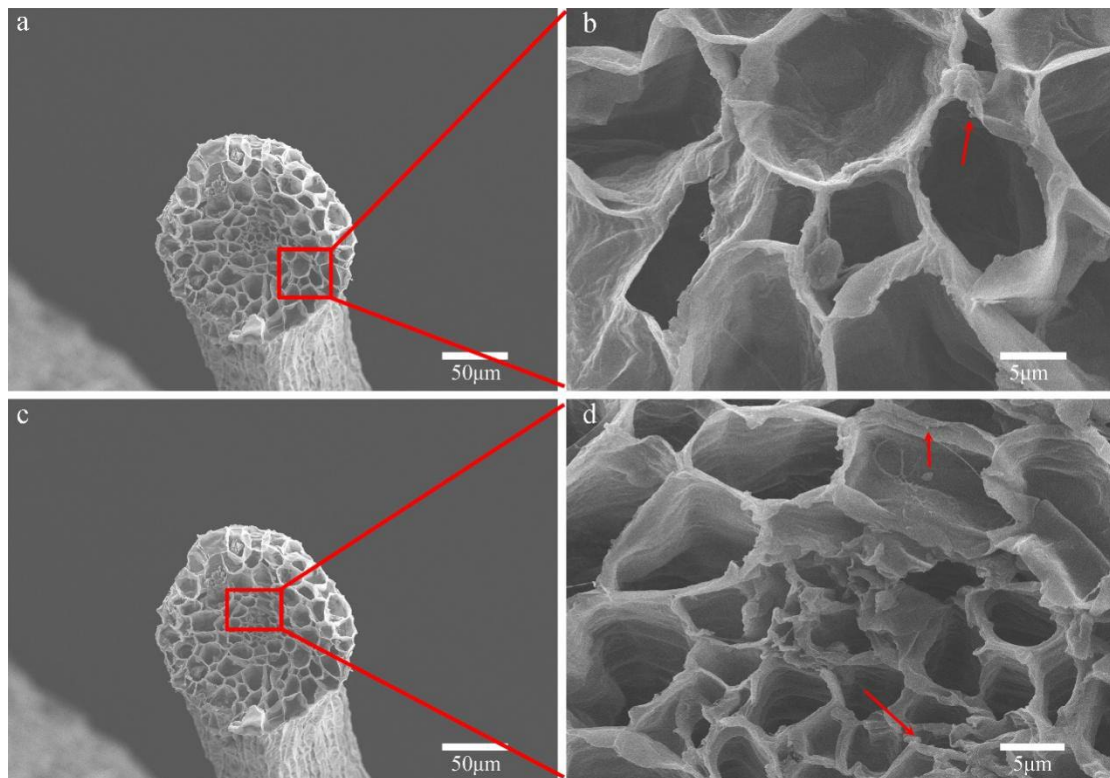
Supplementary Figure S2. Water spinach culture in a humus substrate.



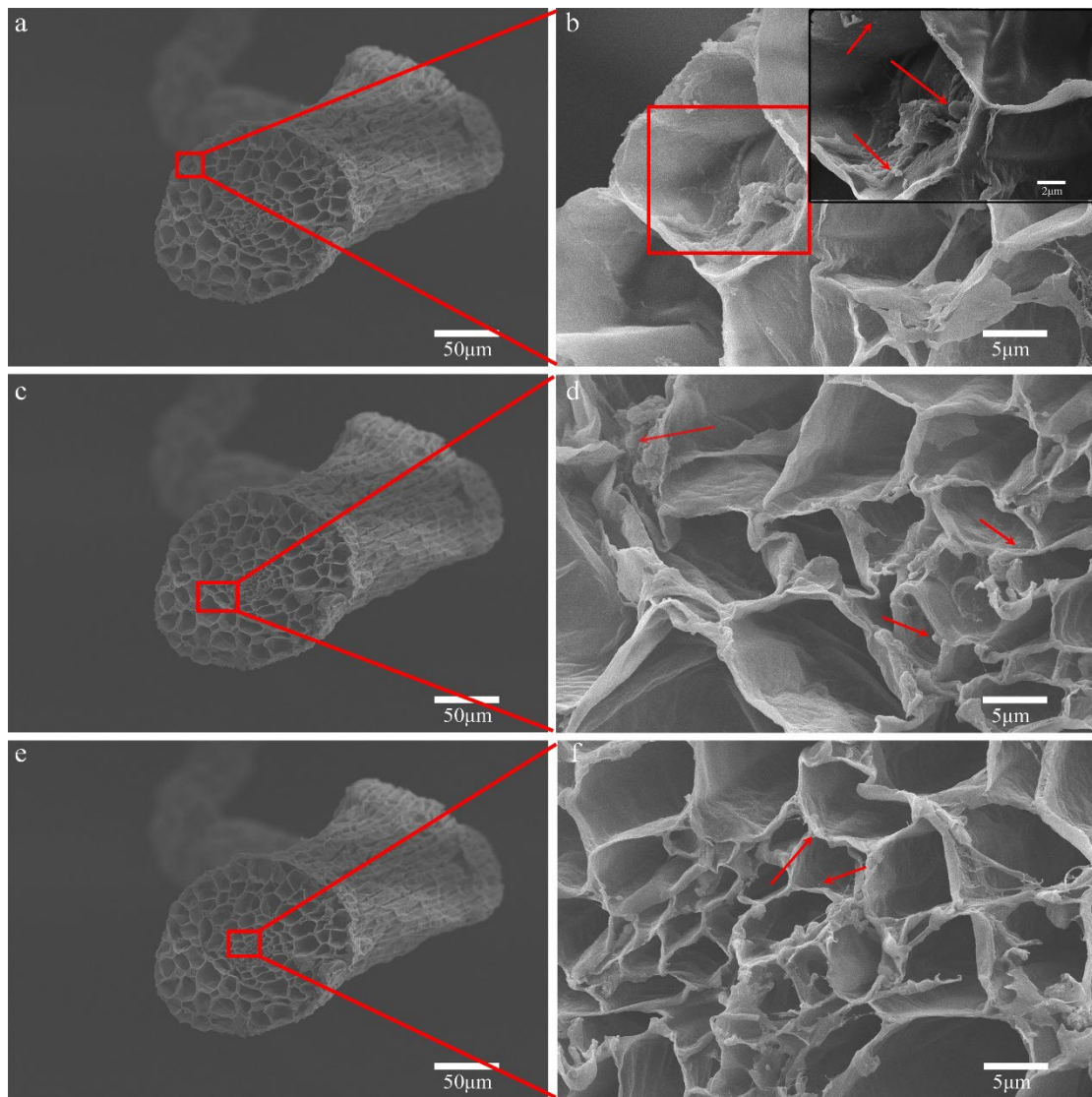
Supplementary Figure S3. Laser scanning confocal microscopic images of the root tip. a, d Images in the open field of view. **b, e** Images under the FITC and TRITC channels. **c, f** Corresponding merged images of **a** and **b**, as well as **d** and **e**, respectively.



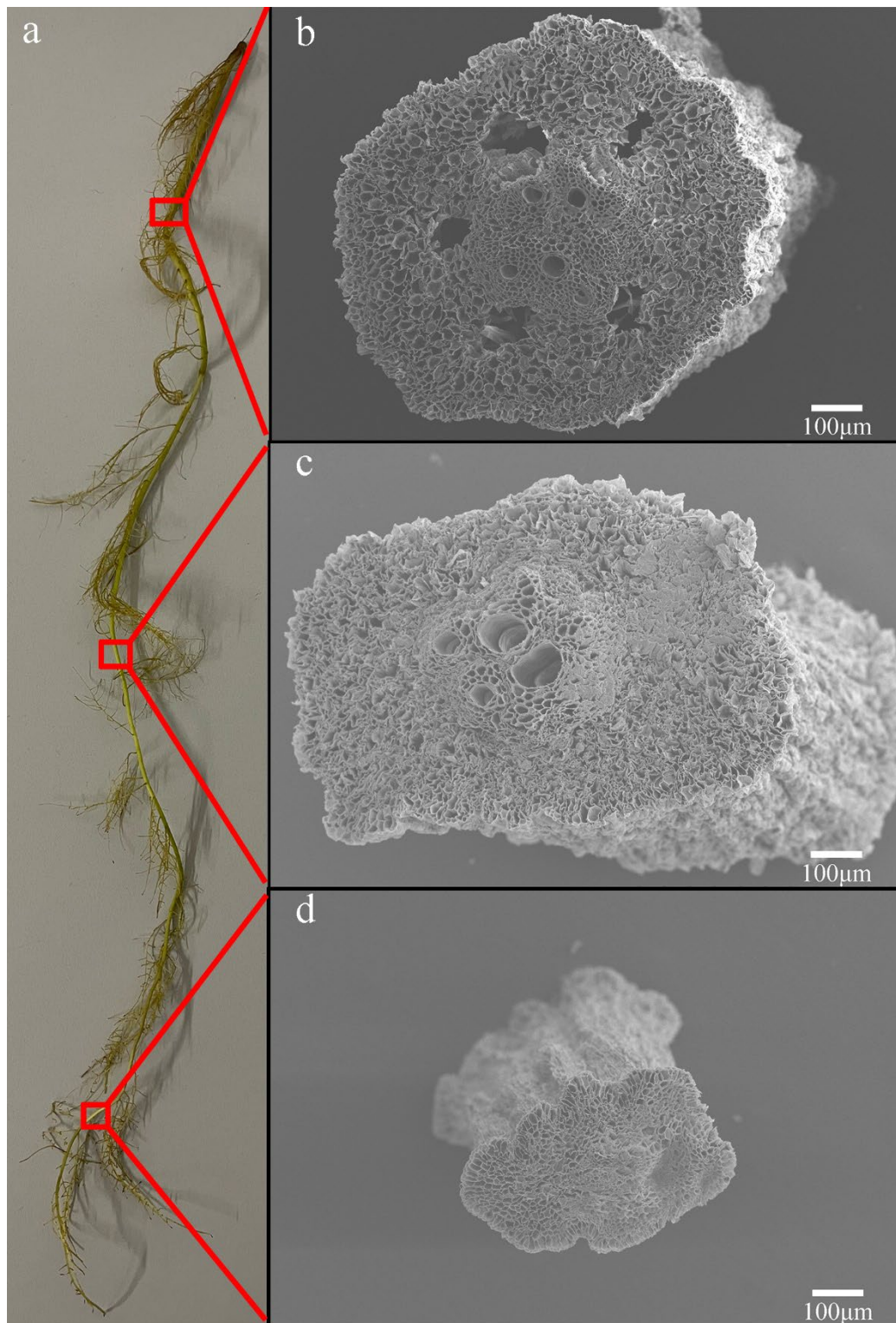
Supplementary Figure S4. Longitudinally cut laser confocal images of roots of two-week-old water spinach plants grown in a solution with 200 nm and 1 μ m PS beads for 10 days. a, d Images in the open field of view. **b, e** Images under the FITC and TRITC channels. **c, f** Composite images of **a** and **b**, as well as **d** and **e**, respectively.



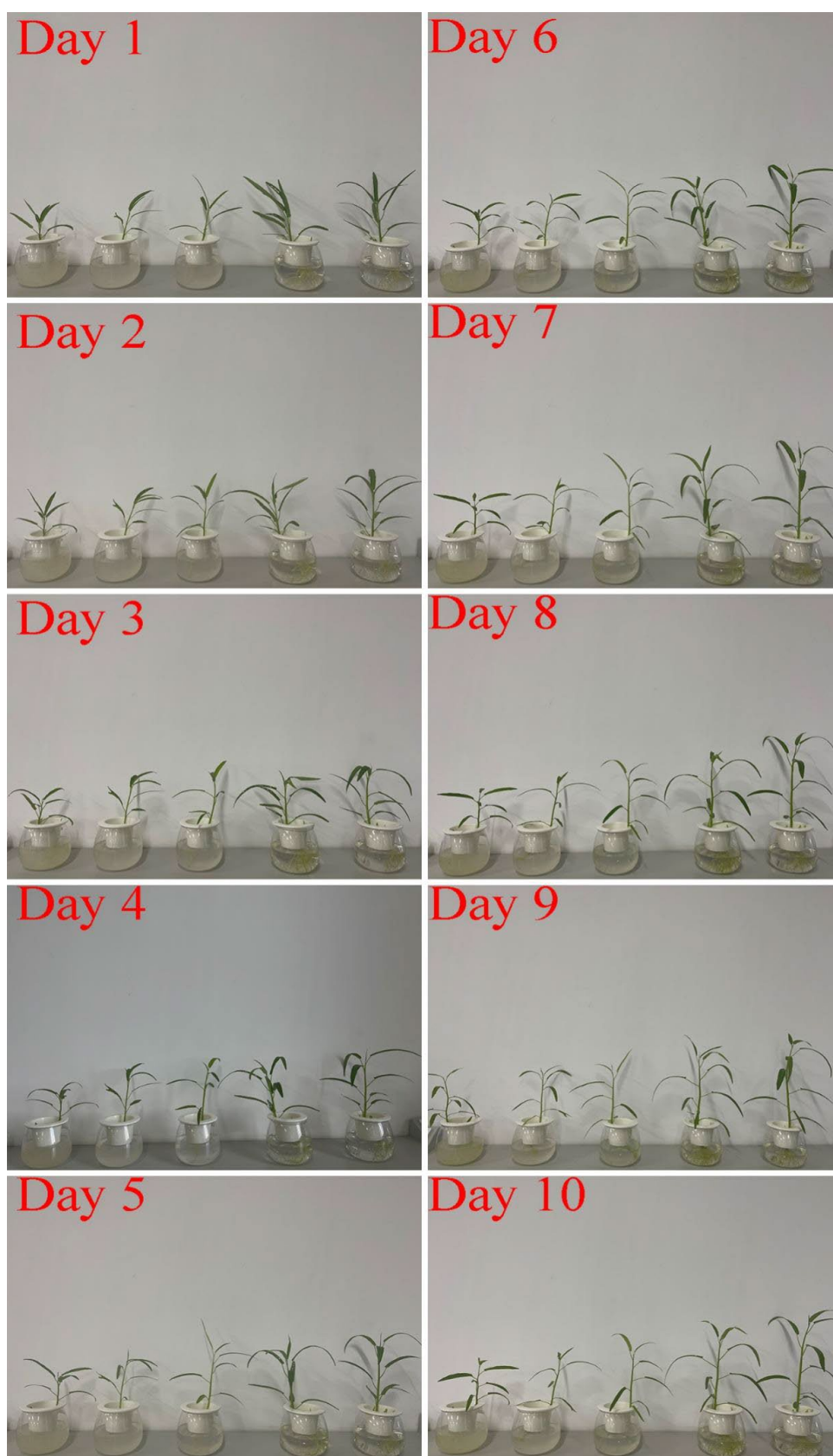
Supplementary Figure S5. SEM images of transverse sections at the junction of lateral roots and secondary lateral roots. a, c Overview of the transverse section of the secondary lateral root. **b, d** Enlarged images of the red boxes in **a, c**, respectively. Red arrows point to 200-nm PS beads.



Supplementary Figure S6. SEM images of transverse sections at the junction of lateral and primary roots. a, c, e Overall image of the lateral root transverse section. **b, d, f** Magnified images of the red box section in **a, c,** and **e.** The inset in **b** is a magnified image of the red box. The red arrows point to 200-nm and 1- μ m PS beads.



Supplementary Figure S7. SEM images of different parts of the root after 10 days of hydroponics cultivation of two-week-old water spinach plants. a Physical appearance of the root. **b, c, d** Transverse cross sections of different tissue sections as indicated by the red boxes in **a**.



Supplementary Figure S8. Growth process of water spinach plants cultured in hydroponics for 10 days. From left to right, the concentrations of PS beads in different containers were 50 mg/L, 30 mg/L, 20 mg/L, 10 mg/L, and 0 mg/L.