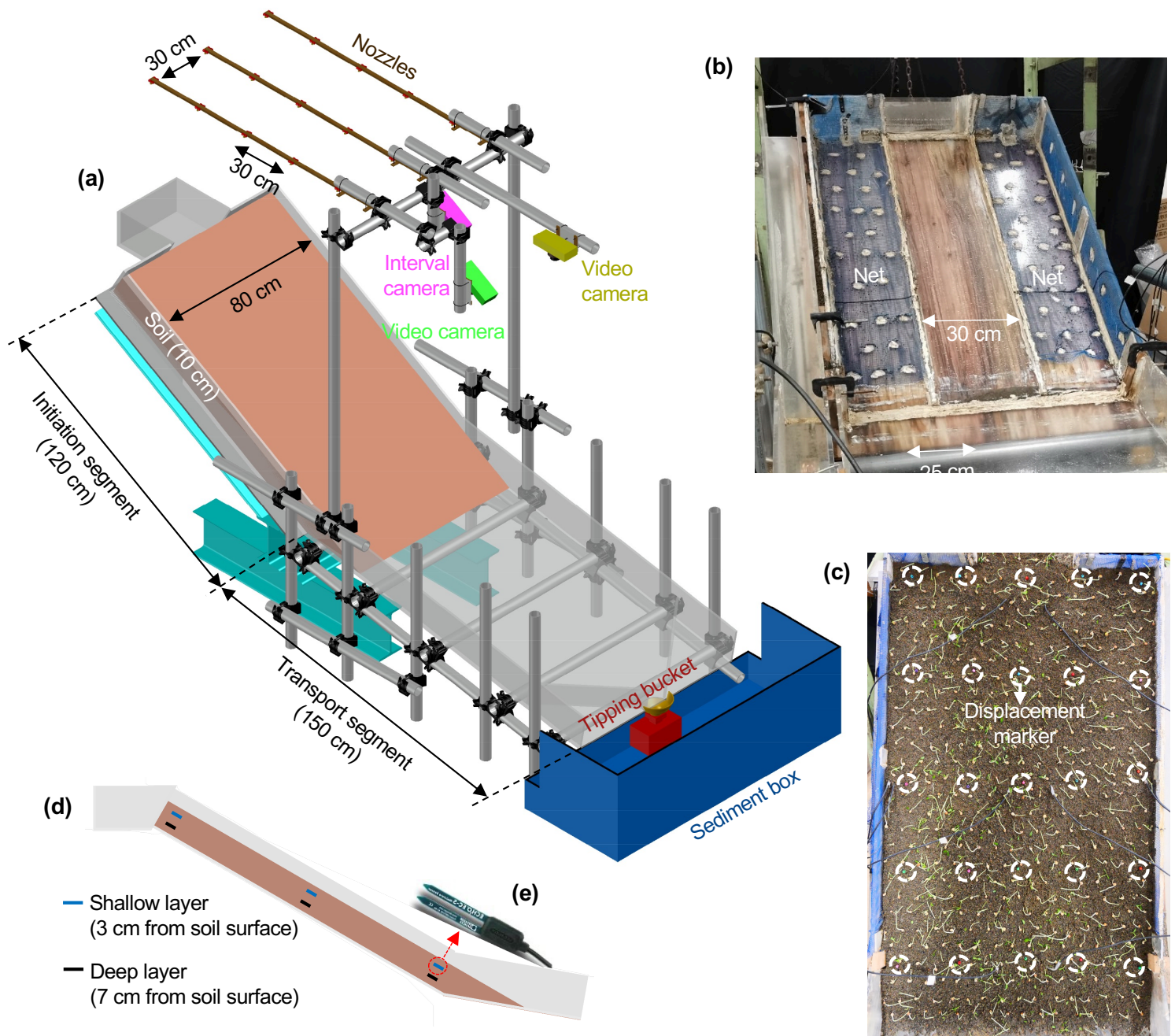
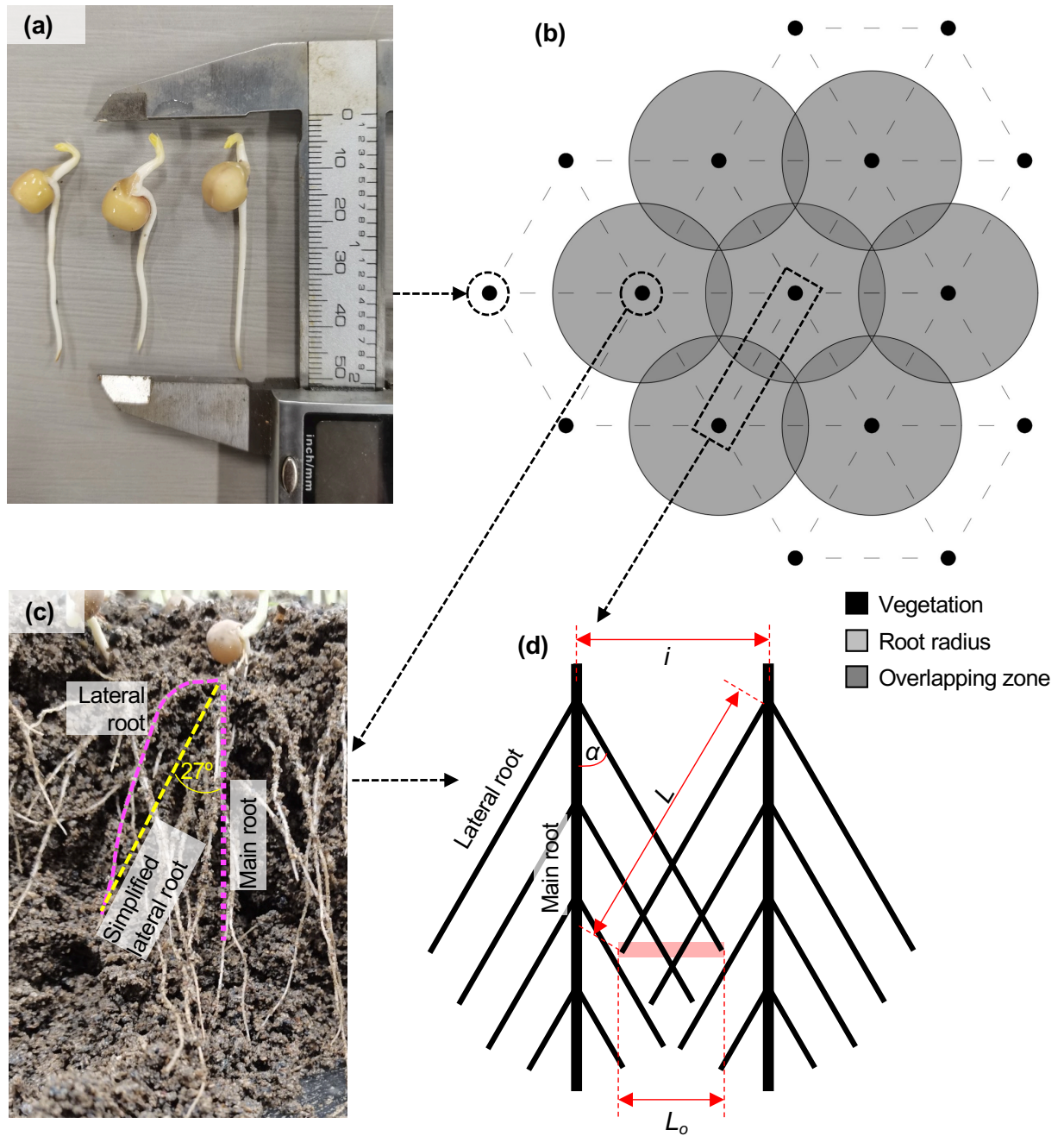


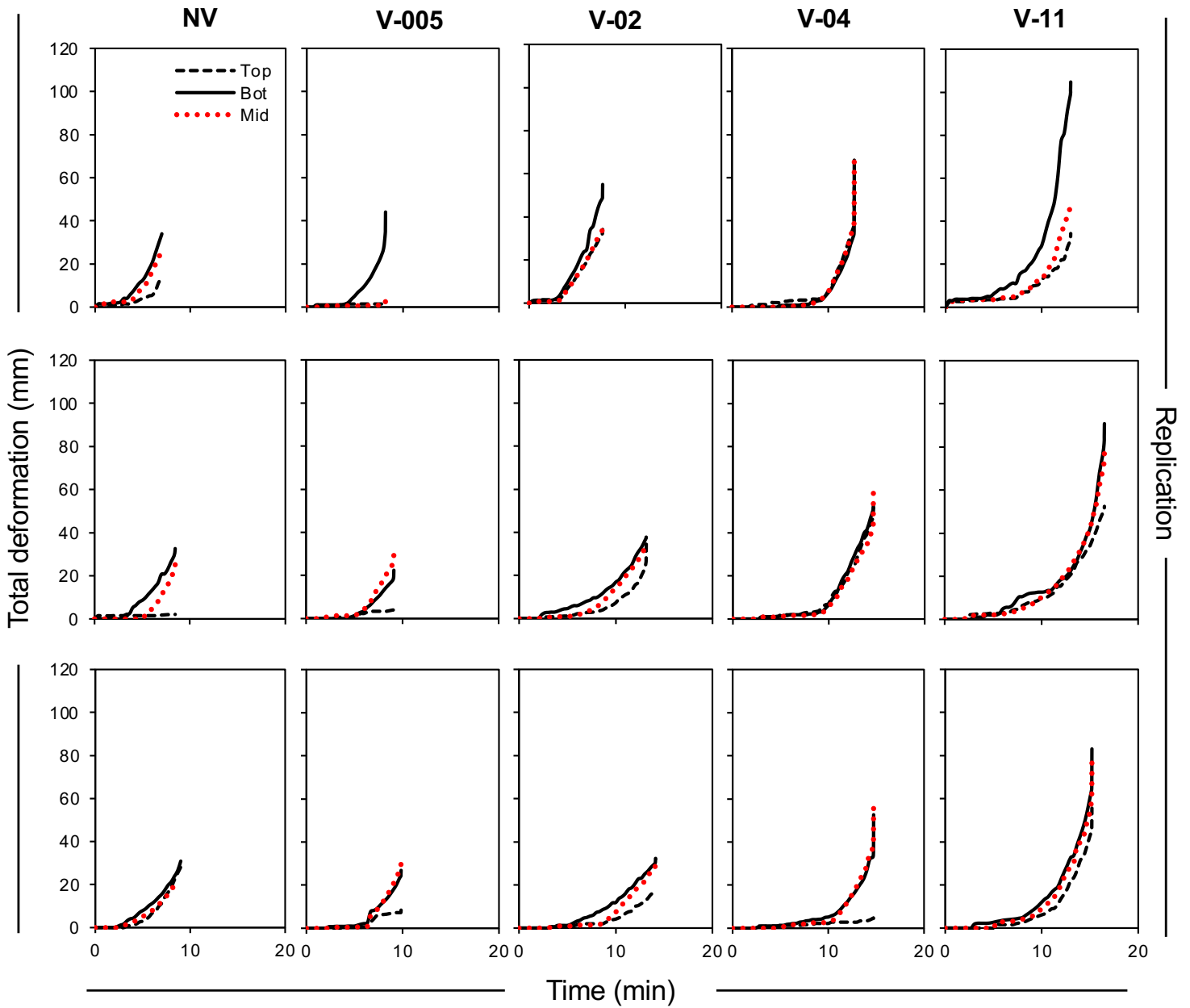


Supplementary Figure 1 Experimental setup. **a**, Illustration of the experimental setup. **b**, Net for creating the boundary lines for potential landslides. **c**, Configuration of displacement markers for measuring slope deformation. White dotted circles indicate locations where the markers were installed. **d**, Configuration of FDR sensors at the longitudinal direction of the slope. **e**, EC-5 Decagon FDR Decagon sensor.

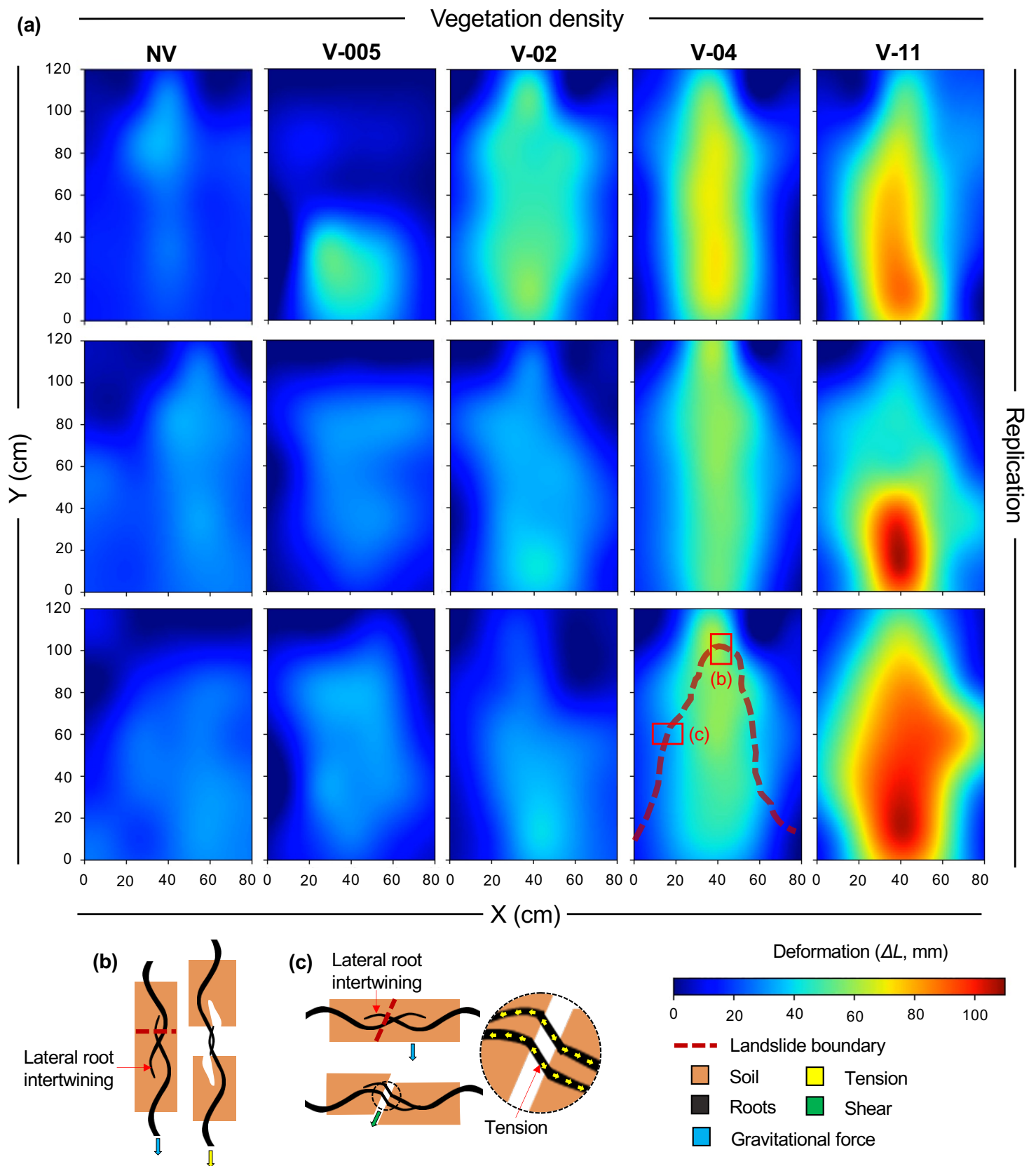


Supplementary Figure 2 Application of vegetation. **a**, Sprouts used for experiments. **b**, Hexagonal pattern of planting to maximize root overlap. **c**, Vegetation root systems on V-11. **d**, Simplification of root overlap, where i represents interval between plants, L is lateral root length, α is the inclination of lateral roots (27°), and L_o is the overlapping length of individual roots.

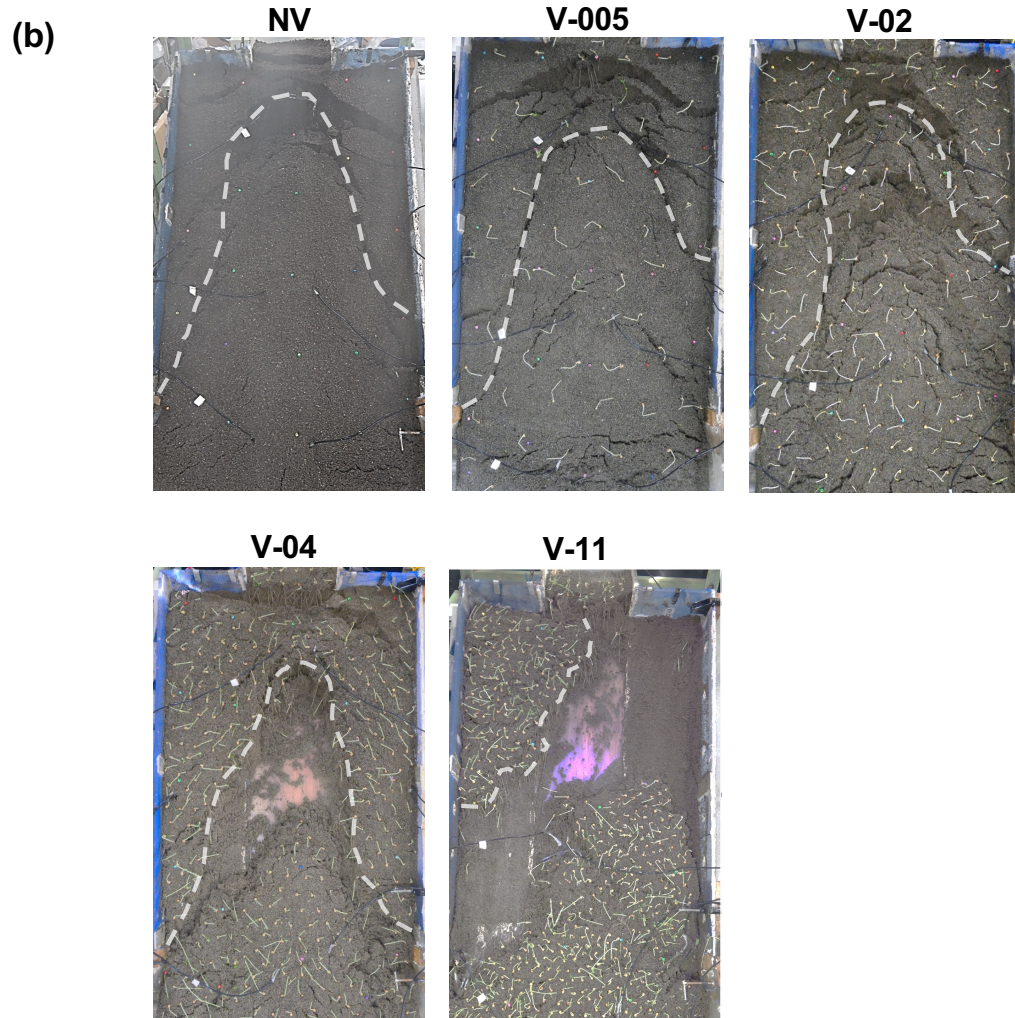
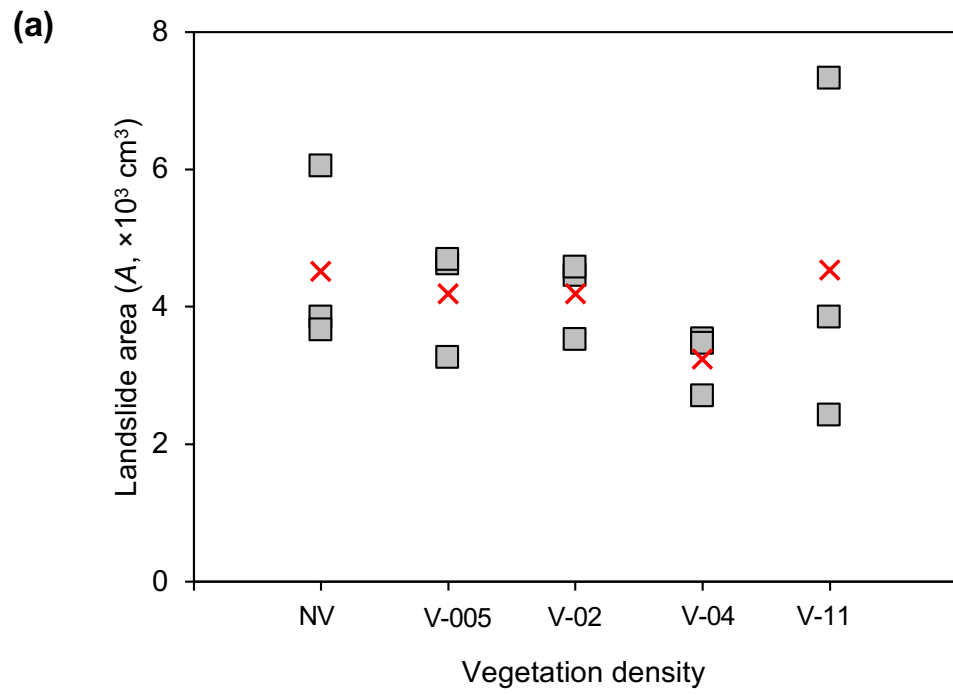
Vegetation density



Supplementary Figure 3 Slope deformation (ΔL). The black-dashed, black, and red-dotted lines represent the deformation measured at the top, bottom, and middle parts of the slope, respectively. NV, V-005, and V-02 exhibited non-uniform deformation at the upper, middle, and lower slopes, indicating insufficient anchoring effects by roots. In contrast, V-04 exhibited uniform deformation, particularly in the middle and lower parts of the slope, indicating sufficient anchoring effects by roots. Deformation on NV occurred between 20-120 s, while that on V was between 61-146 s. NV generated a maximum deformation rate of 0.2-1.2 mm/s, while that on V was 1.8-32.8 mm/s.



Supplementary Figure 4 Deformation during landslide occurrence. **a**, Spatial distribution of deformation values. X represents the flume width, and Y represents the flume length, where Y = 0 and Y = 120 correspond to the lower and upper parts of the slope, respectively. The X-Y plane represents the top view of the slope. The color inside the box represents deformation values. The maximum deformation was observed in V-11 (99 mm $\pm$ 9.6 s.d.), followed by V-04 (60.3 mm $\pm$ 10.7 s.d.), V-02 (45.6 mm $\pm$ 9.5 s.d.), V-005 (36.6 mm $\pm$ 8.1 s.d.), and NV (32.6 mm $\pm$ 1.3 s.d.). Differences in deformation values along the Y-axis indicate tensile or compressive deformation, while differences along the X-axis indicate shear deformation. **b**, Illustration of tensile deformation. **c**, Illustration of shear deformation.



Supplementary Figure 5 Dynamics of slope unstable area. **a**, Landslide size under various vegetation densities. The cross markers show mean values. Each condition has 3 replication data. **b**, Collapse area taken from cameras installed above the flume. White-dash line indicates slope unstable area.