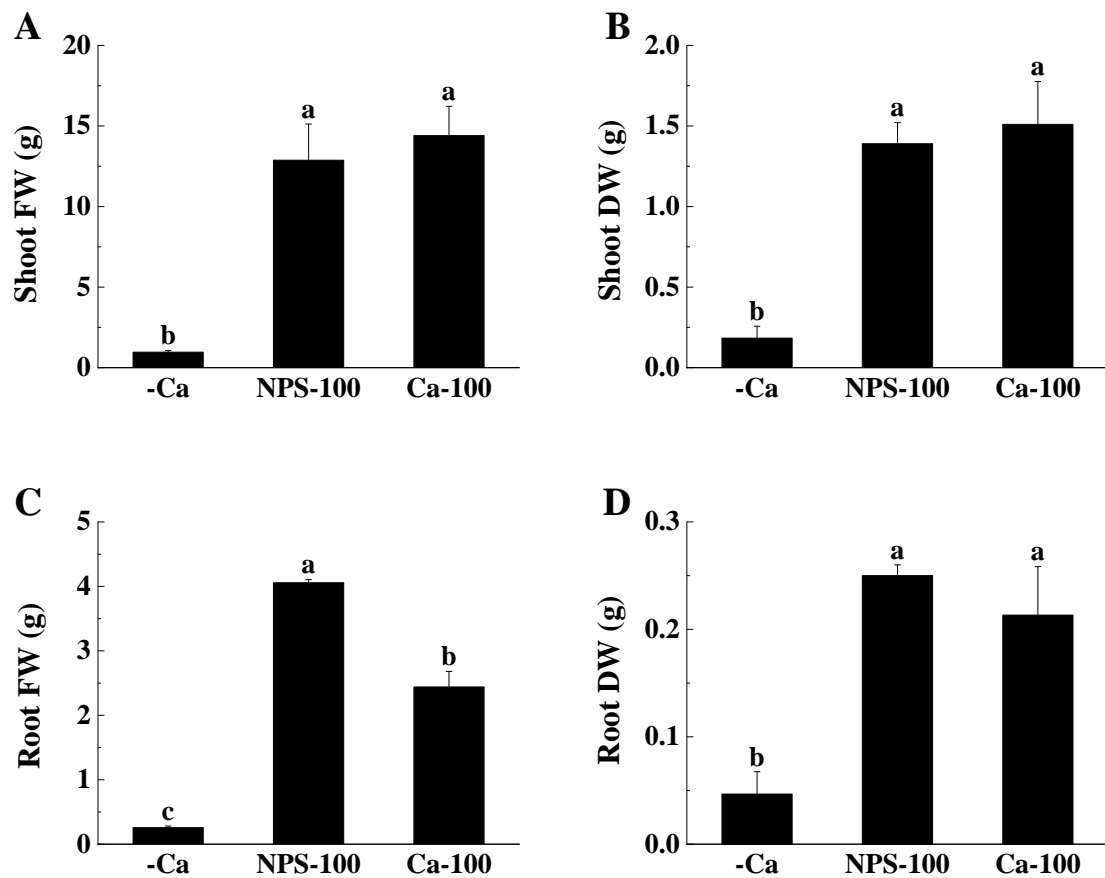
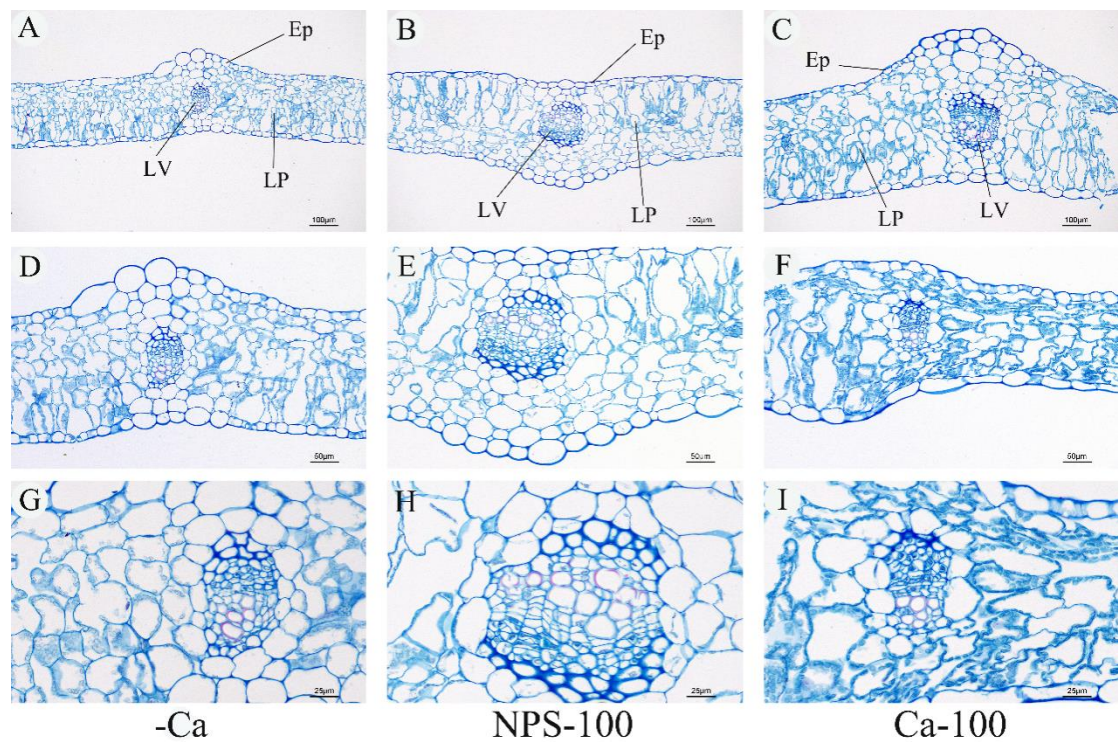


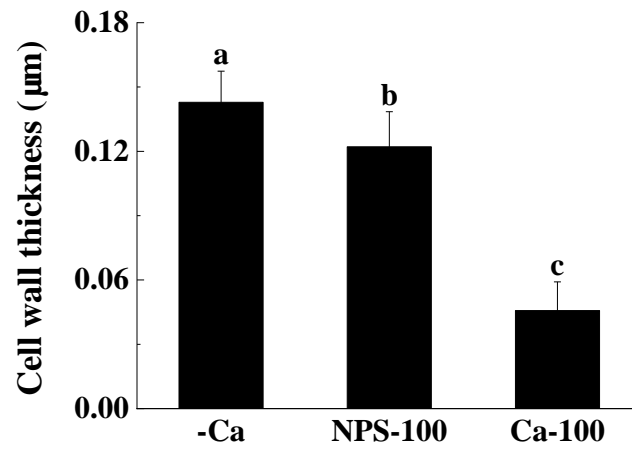
**Fig.S1** Characterization of Ca(L-asp)-NPs. A: TEM images of Ca(L-asp)-NPs; B: Particle size distribution of Ca(L-asp)-NPs; C: Ca solubility of Ca(L-asp)-NPs in nutrient solution, the values were the mean  $\pm$  SD of triplicate samples.



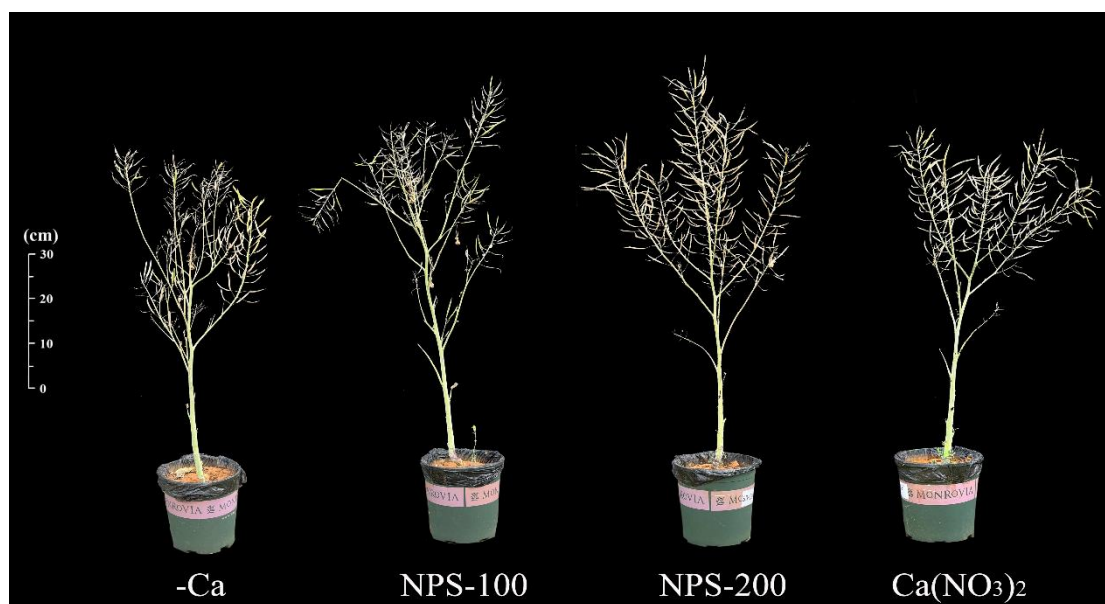
**Fig.S2** Effect of different Ca treatments on biomass of rapeseed. A: shoot fresh weight; B: shoot dry weight; C: root fresh weight; D: root dry weight. Values were three replicates averages. Different lowercase letters indicated significant differences between different treatments ( $P < 0.05$ ). -Ca, NPS-100 and Ca-100 represent no Ca application, 100 mg/L Ca(L-asp)-NPs and 100 mg/L Ca(NO<sub>3</sub>)<sub>2</sub>·4H<sub>2</sub>O, respectively.



**Fig.S3** Effect of different Ca treatments on the lateral anatomical structure of rapeseed leaves. Structure of leaves of -Ca (A, D, G), NPS-100 (B, E, H), and Ca-100 (C, F, I). The scale: 100µm (A-C), 50µm (D-F), and 25µm (G-I). Ep: epidermis, LV: leaf vein, LP: leaf palisade.



**Fig.S4** Effect of different Ca treatments on root cell wall thickness. Values were three replicates averages. Different lowercase letters indicated significant differences between different treatments ( $P < 0.05$ )



**Fig.S5** Effect of different Ca treatments on the phenotype of rapeseed at maturity. -Ca, NPS-100, NPS-200, and  $\text{Ca}(\text{NO}_3)_2$  represent no Ca application, 100 mg/kg Ca(L-asp)-NPs, 200 mg/kg Ca(L-asp)-NPs and 130 mg/kg  $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ , respectively.