

Figure captions

Fig 1. Effects of exogenous zinc on photosynthesis of *Dendrobium nobile*. a is net photosynthetic rate (Pn), b is transpiration rate (Tr), c is stomatal conductance (Gs) changes and d is the carbon dioxide concentration (Ci) changes with the time of zinc treatment and zinc concentration. Data are means \pm SE in the figures. Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 μ mol/L.

Fig. 2 Effect of H₂O₂ (a) and superoxide content(b) of *Dendrobium nobile* under different Zn treatment. Data are means \pm SE in the figures. Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 μ mol/L.

Fig. 3 Effect of different concentrations of zinc on the content of soluble sugar(a), proline and soluble protein(b) in *Dendrobium nobile* leaves. Data are means \pm SE in the figures. Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 μ mol/L.

Fig. 4 Effect of APX, AsA and GSH content of *Dendrobium nobile* under different Zn treatment. a for APX, b for AsA and c for GSH. Data are means \pm SE in the figures. Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 μ mol/L.

Fig.5 Effect of polysaccharide(a), polyphenols(b) and flavonoids(c) content of *Dendrobium nobile*. under different Zn⁺ treatment. Data are means \pm SE in the figures.

Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 $\mu\text{mol/L}$.

Fig.6 The contents of zinc in polysaccharides. Note: Data are means \pm SE in the figures. Different letters indicate significant differences among the treatments ($P < 0.05$). CK, T1, T2, T3, T4, T5, T6 and T7 indicate that corresponding Zinc concentration is 0, 50, 100, 200, 400, 800, 1000 and 2000 $\mu\text{mol/L}$.

Fig.7 The process of alleviating zinc stress injury in *Dendrobium nobile*. The oxidation protection achieved by producing antioxidants, soluble substances and chelating zinc.