

**Excessive nitrogen application dampens antioxidant capacity and grain filling in
wheat as revealed by metabolic and physiological analyses**

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Running title: Negative effects of excessive N on wheat yield

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Supplementary Information

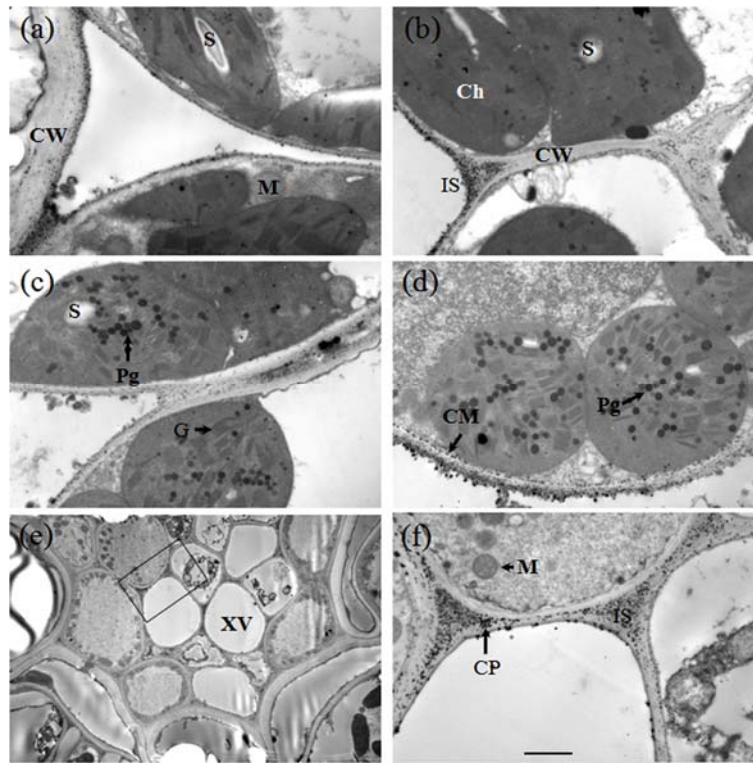


Figure S1. Detection of H_2O_2 in flag leaves of wheat. The presence of H_2O_2 is marked by electron-dense precipitates of cerium perhydroxides, which was localized to cell walls and the cell membrane and intercellular space of palisade tissues and vascular bundle. Bar: (a), (b), (c), (d) and (f): 1 μm ; (e): 5 μm . CP, cerium perhydroxides; Ch, chloroplast; CM, cell membrane; IS, intercellular space; M, mitochondria; XV, xylem vessel.

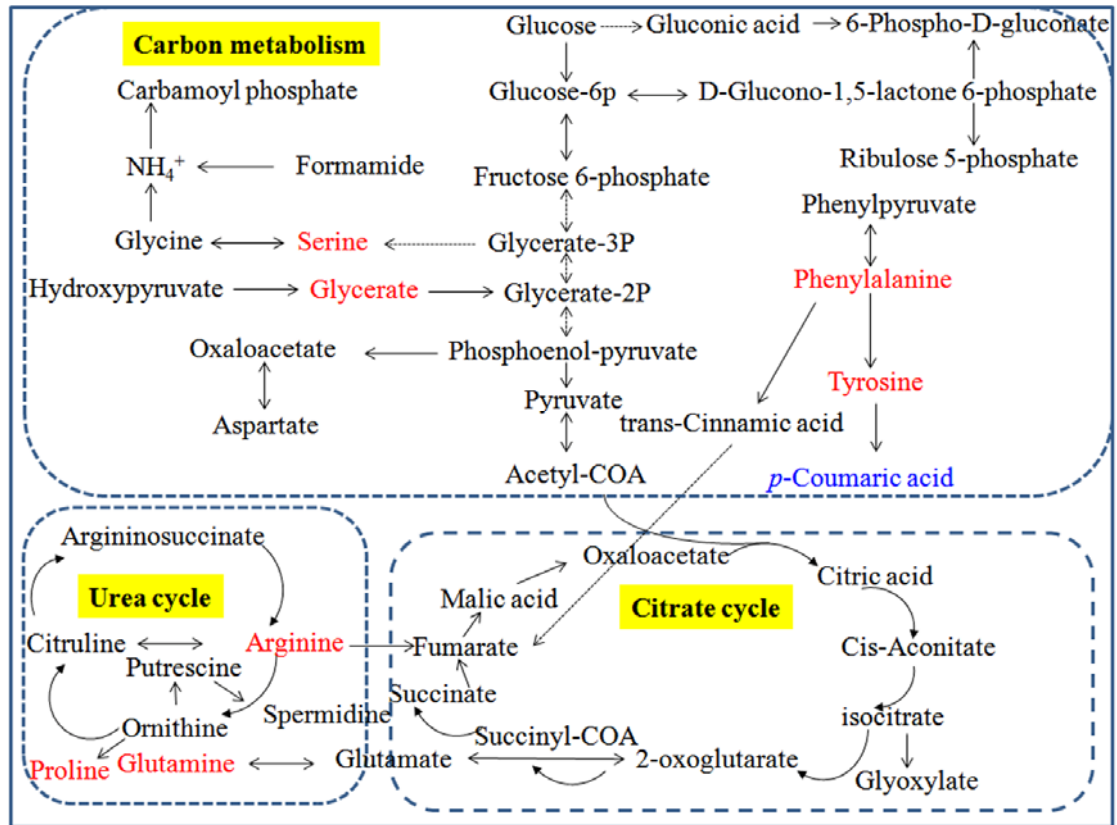


Figure S2. Comprehensive metabolic pathways involved in C metabolism and N metabolism in Nn and Ne flag leaves of wheat. The red font means the up-regulated metabolites for Ne treatment; the blue font means the down-regulated metabolites for Ne treatment.