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Short-term Salt Stress Strongly Affects Dynamic Photosynthesis, but not Steady-State Photosynthesis, in Tomato (*Solanum lycopersicum*)

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Highlights

- Short-term (7-9 d) salt stress inhibits dynamic but not steady-state photosynthesis
- Closed stomata and slow Rubisco activation cause slower photosynthetic induction
- Rapid stomatal closure in shade reduces lightfleck photosynthesis under salt stress

Abstract:

Salt stress occurs worldwide due to widespread soil salinization. Also, plants are often subjected to rapidly alternating periods of sun and shade (sunflecks). Despite this combined occurrence of salt stress and sunflecks, dynamic photosynthetic responses to sunflecks under salt stress remain unknown. This study addresses this discrepancy by exploring photosynthetic gas exchange and chlorophyll fluorescence, both after dark-light transitions and during artificial light fluctuations (lightflecks and shadeflecks), in salt stressed leaves. Three weeks old growth-chamber grown tomato (*Solanum lycopersicum* Mill 'Beijing Cherry Tomato') plants were exposed to 0, 70 or 140 mM of sodium chloride (NaCl), for 7-9 days. Photosynthetic induction after dark-light transitions was strongly inhibited in salt-stressed leaves, due to increased transient stomatal limitation and slower apparent Rubisco activation. During photosynthetic induction, non-photochemical quenching (NPQ) and intrinsic water use efficiency (WUE_i) were positively correlated with [NaCl]. Under periods of low