3.3 Regulation of photosynthetic performance and biomass accumulation

Grafting also regulates vegetative growth by sustaining leaf physiology and photosynthetic function. Under salt stress, grafted plants maintained higher photosynthetic pigment levels than non-grafted plants, and both *S. grandifolium* × *S. melongena* and *S. torvum* rootstocks improved chlorophyll fluorescence parameters and reduced Na^+ accumulation in the scion, which supported better growth under stress (Mozafarian et al., 2023). Under drought-related stress, grafting combined with vermicompost was positively associated with SPAD, leaf area, relative water content, shoot dry weight, and root fresh weight, indicating coordinated improvement in leaf function and biomass retention (Kıran et al., 2026).

Biomass accumulation in grafted eggplant appears to be driven by improved whole-plant assimilation and allocation rather than by leaf greenness alone. Deficit-irrigation experiments showed that enhanced canopy vigor, photosynthesis, and resource uptake in grafted plants increased fruit yield by 12.7%-24.5% while also supporting shoot biomass under stress (Wakchaure et al., 2025). Anatomical and comparative growth studies further indicate that larger root volume, greater crown diameter, and higher SPAD values are linked with earlier and faster growth in grafted eggplant, while broader grafting research using eggplant rootstocks has associated higher relative growth rate, leaf area ratio, and net assimilation rate with superior grafted-plant performance (Figure 1) (Kappel et al., 2024).

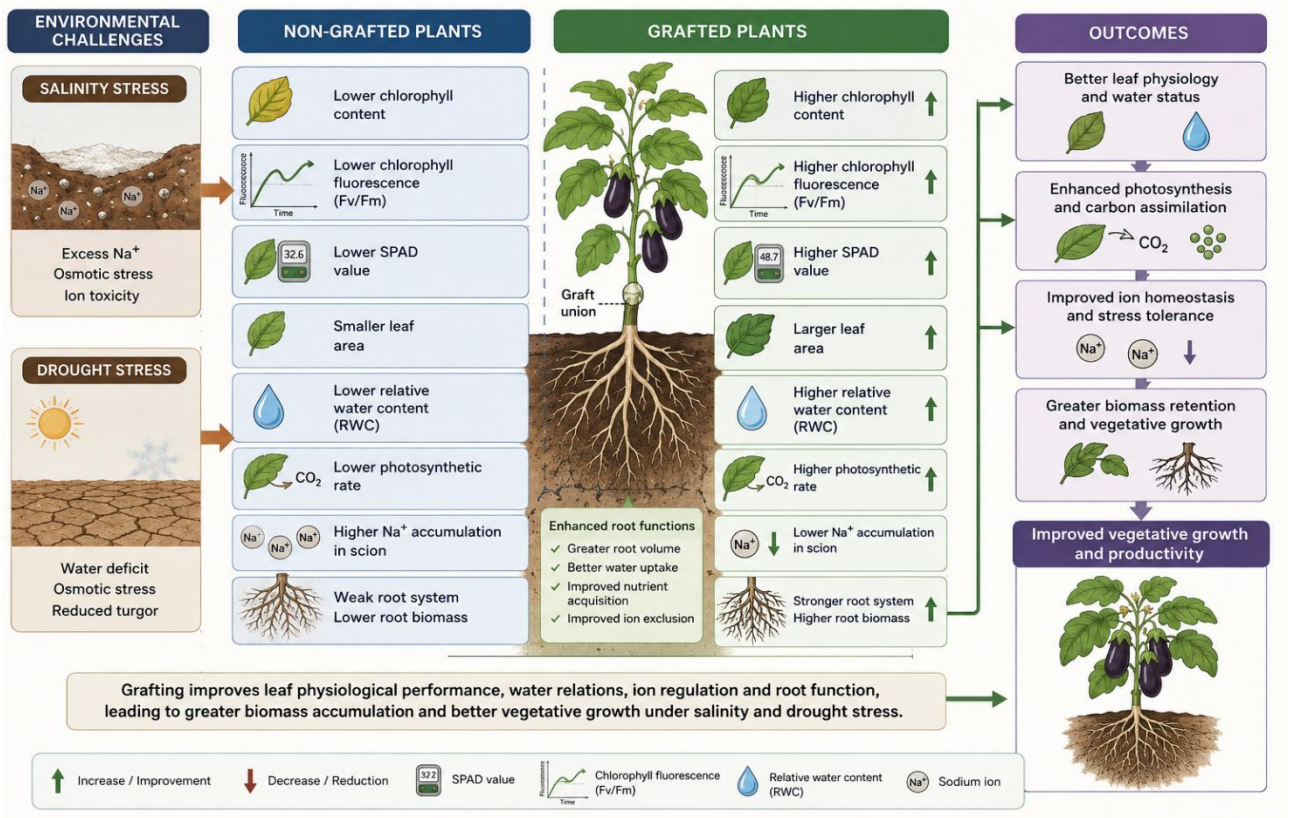

Figure 1 Conceptual framework illustrating the effects of grafting on leaf physiology, photosynthetic performance, ion regulation, and vegetative growth of eggplant under salinity and drought stress

4 Effects of Grafting on Eggplant Yield Formation

4.1 Improvement of flowering and fruit setting characteristics

Grafting can improve reproductive development in eggplant by increasing precocity and supporting earlier transition to effective fruit production when vigorous and compatible rootstocks are used (Musa et al., 2020). In interspecific rootstock systems, the strongest combinations produced greater fruit earliness together with higher early yield, indicating that reproductive advantage begins before final harvest and is closely linked to rootstock vigor and compatibility. This pattern suggests that grafting can shift yield formation forward in time, especially where rapid establishment and strong sink support favor early flowering and fruit retention (Kappel et al., 2024).