

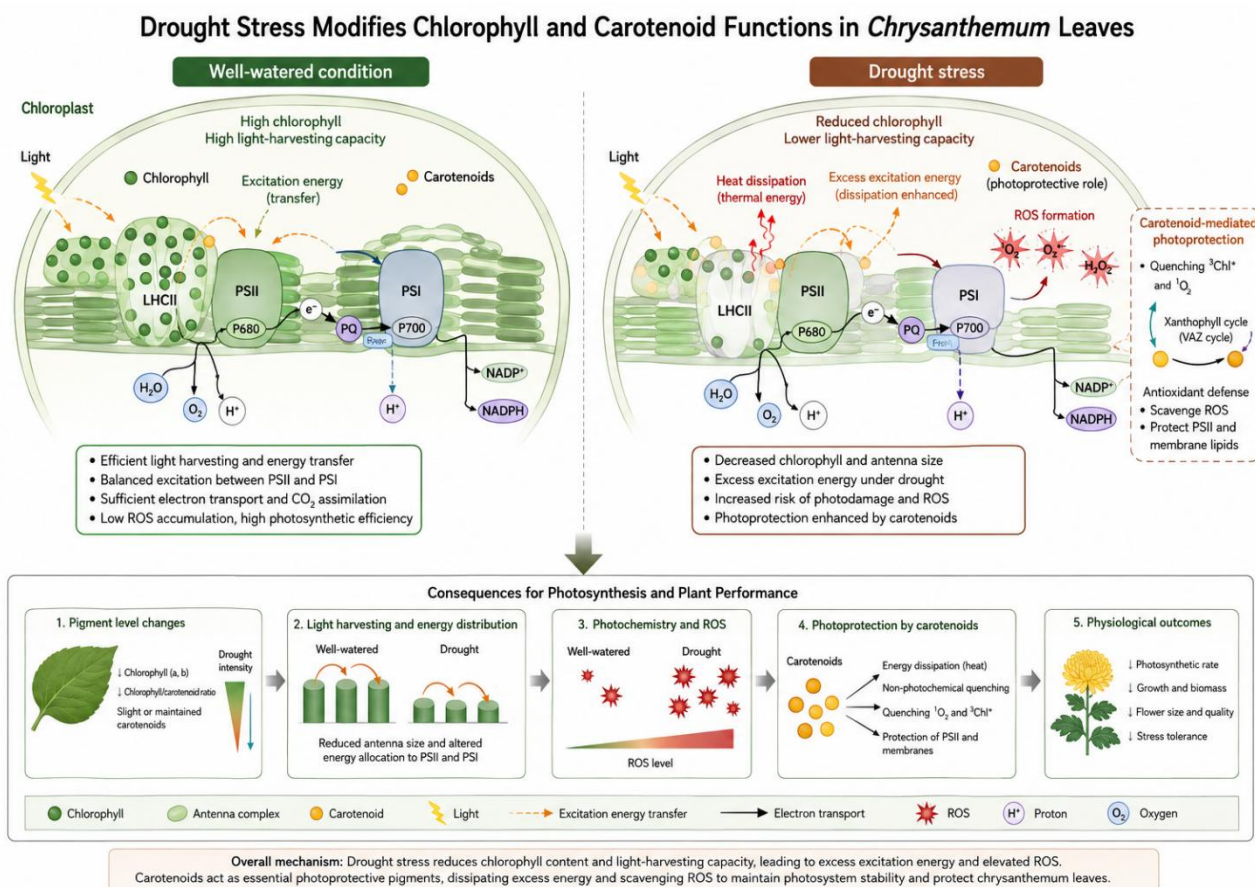


Figure 2 Mechanistic model of drought-induced regulation of chlorophyll and carotenoid functions in *Chrysanthemum morifolium*

6.3 Identification of key physiological indicators for drought adaptation

The most robust physiological indicators for drought adaptation in *Chrysanthemum* are traits that jointly reflect hydration status, photosynthetic integrity, and cellular protection. Multivariate analyses in standard and spray *Chrysanthemum* identified relative water content, membrane stability index, chlorophyll a and b, total chlorophyll, carotenoids, and chlorophyll fluorescence as major contributors to drought-related phenotypic variation and as practical selection indices for tolerant genotypes (Namita et al., 2025). These traits are especially useful because they integrate both functional performance and accumulated damage across different stress environments.

Biochemical indicators further refine this evaluation by distinguishing plants that merely endure dehydration from those that actively maintain homeostasis. Tea *Chrysanthemum* studies showed that increasing drought raised malondialdehyde, proline, and soluble protein while reducing growth and gas exchange, whereas comparative species analysis found that the more tolerant *Chrysanthemum* type maintained better water status, stronger antioxidant enzyme activity, less membrane damage, and less compromised photosynthesis (Zhang et al., 2022). Taken together, a comprehensive case-study assessment should prioritize relative water content, chlorophyll fluorescence, gas-exchange traits, membrane injury indices, and antioxidant or osmotic markers as the key physiological indicators of drought adaptation.

7 Agronomic Strategies for Improving Drought Tolerance and Water Use Efficiency in *Chrysanthemum* Production

7.1 Optimized irrigation management under water-limited conditions

Optimized irrigation management in *Chrysanthemum* production should aim to conserve water without causing irreversible drought injury. Regulated and sustained deficit irrigation are already recognized in ornamental crops as practical tools for controlling growth, hardening plants, and increasing water use efficiency, provided the strategy is adjusted to species-specific tolerance thresholds. In *Chrysanthemum* specifically, irrigation scheduling