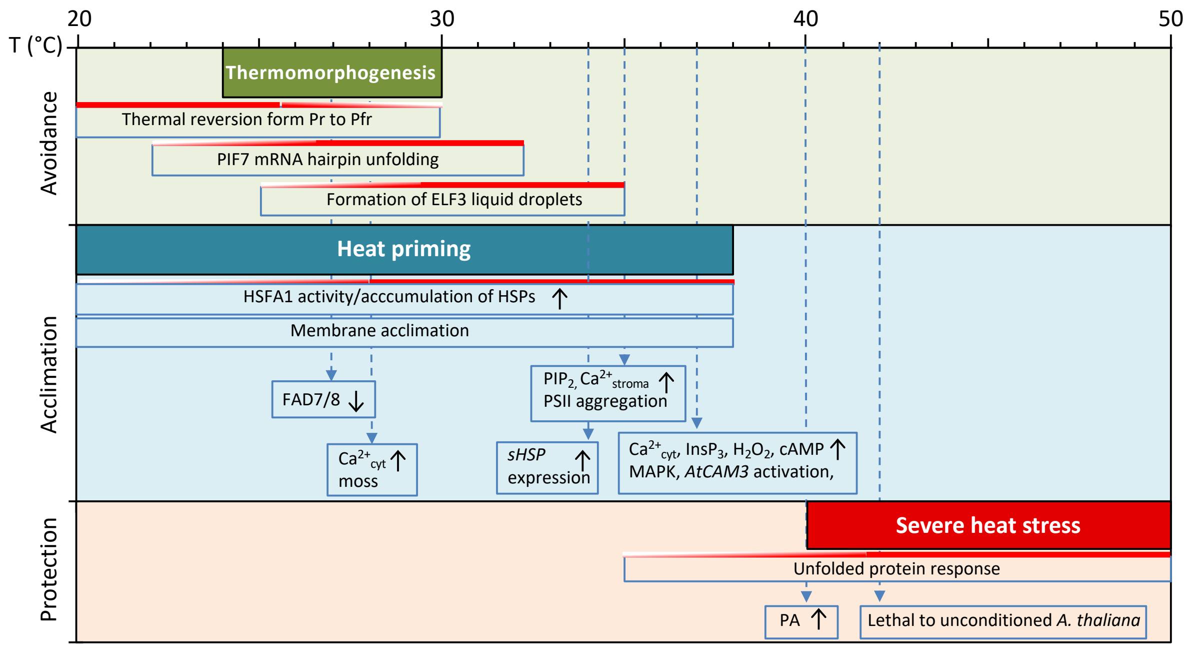

Figure 1. Schematic overview of responses in different warm temperature ranges.

Plants display a wide array of responses when they experience above optimal temperatures. At warm ambient temperatures, up to 30°C, Arabidopsis responds by changes in morphology and development, called thermomorphogenesis, which could aid in avoidance of future heat stress. Thermomorphogenesis features the temperature-sensitive function of phyB. Also in this temperature range, there is thermosensitive regulation of PIF7 mRNA translation. Warm temperatures lead to the loss of a hairpin structure of PIF7 mRNA, which allows for its translation. ELF3 undergoes temperature-dependent phase separation. High temperatures promote the coalescence of ELF3, and the inhibition of ELF3-DNS binding, At temperatures up to 38°C, Arabidopsis initiates acclimation responses that counteract damage to proteins and membranes, and maintain cellular homeostasis. This process involves the activity of HSFA1 master transcriptional factors (Liu & Charng, 2013). HSPs/sHSP accumulate to limit misfolding of proteins. and the membrane's lipid composition is adjusted so as to prevent disruption of the bilayer structure due to uncontrolled increases in membrane fluidity. The heat sensors that activate acclimation are unknown. The accumulation, within the first ±15 min of heat stress, of putative signaling components, such as Ca^{2+}, H_2O_2, PIP_2, PA and cAMP suggests their function in heat perception, closely tied to the sensor. Temperatures above 40°C are damaging to Arabidopsis, and all responses in this range are devoted to immediate protection of cellular structures. Mechanisms of clearance and rescue of unfolded proteins, including the UPR, are important for survival of severe heat stress. These heat stress responses rely on the recognition of unfolded proteins in the ER, the cytosol, and diverse organelles.