

water status at this stage strongly affects soluble solids, firmness, cracking risk, and market quality. This second period is therefore critical in a different sense: it is the stage where water can be adjusted most effectively to reshape quality (Fabeiro et al., 2002; Yavuz et al., 2021; Xue et al., 2025).

For growers, the practical implication is straightforward. Irrigation frequency should be higher or at least more stable when the crop is setting and enlarging fruit, especially in protected systems with shallow effective rooting or soilless substrate (Figure 1). Later, once marketable fruit size is largely established, reducing frequency or applying mild deficit can improve sweetness and reduce cracking, provided the stress remains controlled and does not become severe enough to depress yield. That principle appears consistently in studies from Spain, Turkey, Taiwan, and China despite differences in climate and production system (Kuscu and Turhan, 2022; Sun et al., 2024; Xue et al., 2025; Fang et al., 2026).

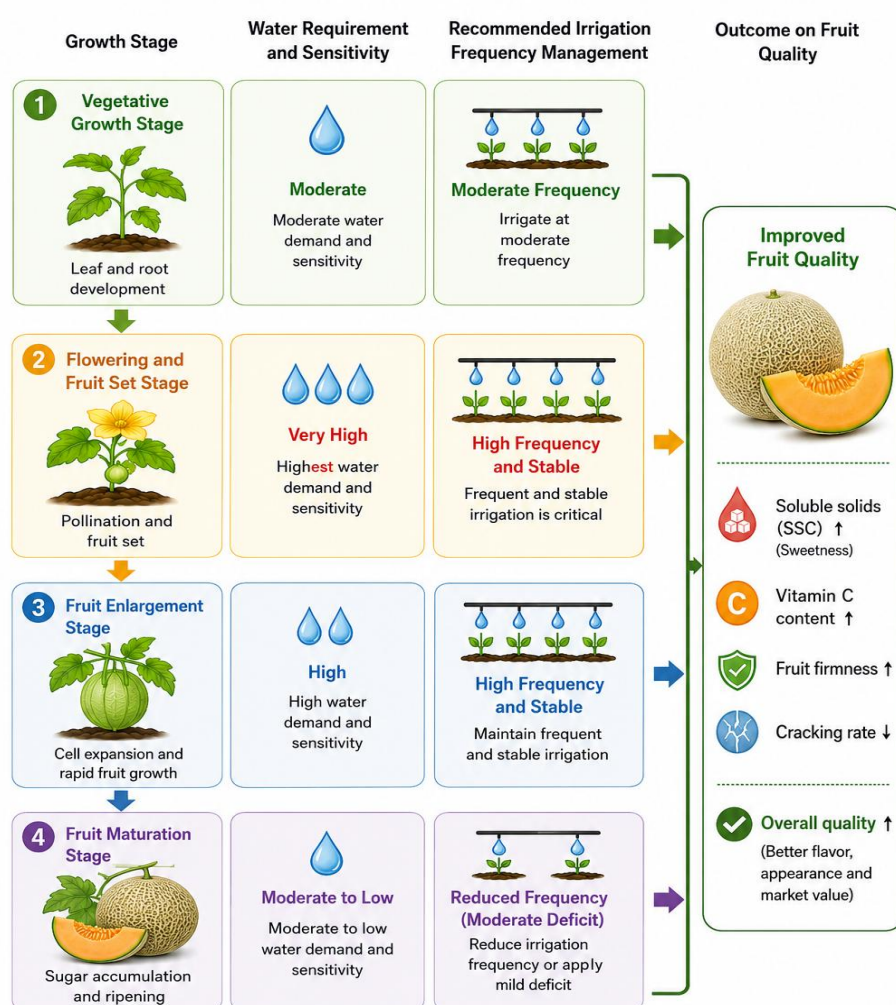


Figure 1 Framework of water sensitivity and irrigation frequency management across melon growth stages

### 3 Effects of Irrigation Frequency on Melon Growth

#### 3.1 Influence on plant height and biomass accumulation

Vegetative growth is usually the first visible response to irrigation frequency. When irrigation is delivered in smaller, more frequent doses under drip systems, the root zone tends to experience fewer sharp moisture fluctuations, which often supports taller plants, thicker stems, higher fresh mass, and greater dry matter accumulation. In a net-house study from Cambodia, three drip irrigations per day produced the greatest plant height, stem diameter, biomass accumulation, and yield relative to one or two irrigations per day and hand watering, despite equal total water based on crop requirement. This is a useful reminder that frequency can change plant performance even when the seasonal water amount is similar (Nut et al., 2019).