

advanced floral initiation (26 days to flowering) and supported higher yields than T-trellis or pyramid forms, suggesting that more favorable light distribution and reduced stress within the canopy can accelerate flowering and enhance fruit set (Karunakaran et al., 2026). Under the same species, experiments in trellised pitaya showed that leaving more cladodes per meter increased flowering intensity, but fruit set and fruit size were largely independent of pruning level; instead, fruit weight declined when more than one fruit developed per cladode, and flower bud drop increased on cladodes bearing many flowers, indicating strong intra-shoot competition for assimilates between flowers and developing fruits (Chiamolera et al., 2023).

Canopy Structure and Light Distribution Comparison

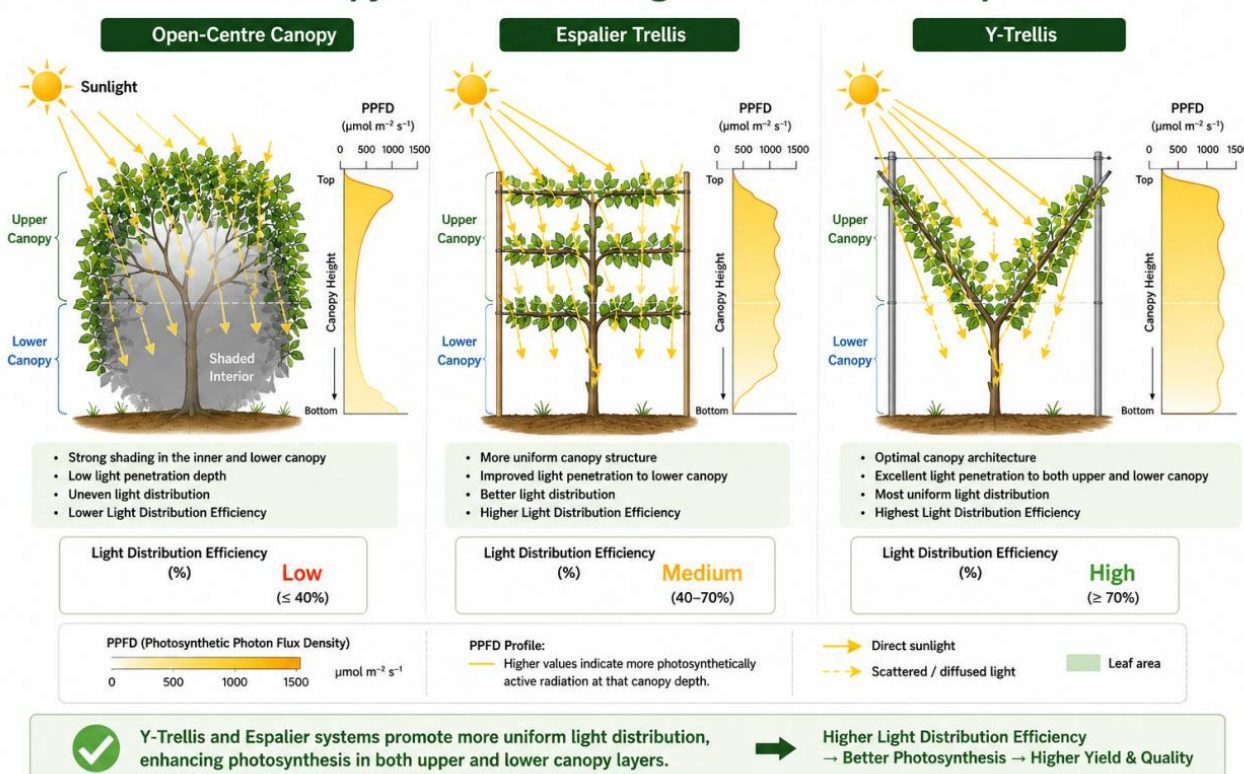


Figure 2 Conceptual comparison of canopy light distribution under open-centre, espalier, and Y-trellis training systems

Cucurbit studies illuminate how resource status and canopy structure affect sex expression and assimilate allocation. In monoecious cucumber, increased nutrient supply raised the number of female flowers and altered the male:female ratio, while pollination level changed female flower numbers during later flowering and affected fruit growth and seed set, yet the total number of fruits and overall seed output per plant did not increase proportionally, implying that reproductive allocation is buffered and not always optimally matched to initial flower production (Gao et al., 2021). Simulation work in cucumber canopies shows that when total biomass production is low, a greater fraction of assimilates is partitioned to leaves and stems to increase light interception, reducing allocation to fruits and increasing investment in side shoots; this demonstrates a structural-functional feedback whereby canopy architecture and light capture demands can divert assimilates away from reproductive sinks.

5 Effects of Trellising Systems on Yield Formation

5.1 Effects on fruit number and individual fruit weight

Trellising systems markedly influence fruit number per plant in Luffa and related cucurbits. In sponge gourd, above-ground training on bower and netting systems significantly increased fruits per plant compared with ground trailing, with the bower system giving the highest fruit number and total yield (Thakur and Pathania, 2025). Similar patterns appear in bottle gourd, where bower training produced the highest number of fruits per vine and yield per hectare, outperforming ground trailing and other training systems.