

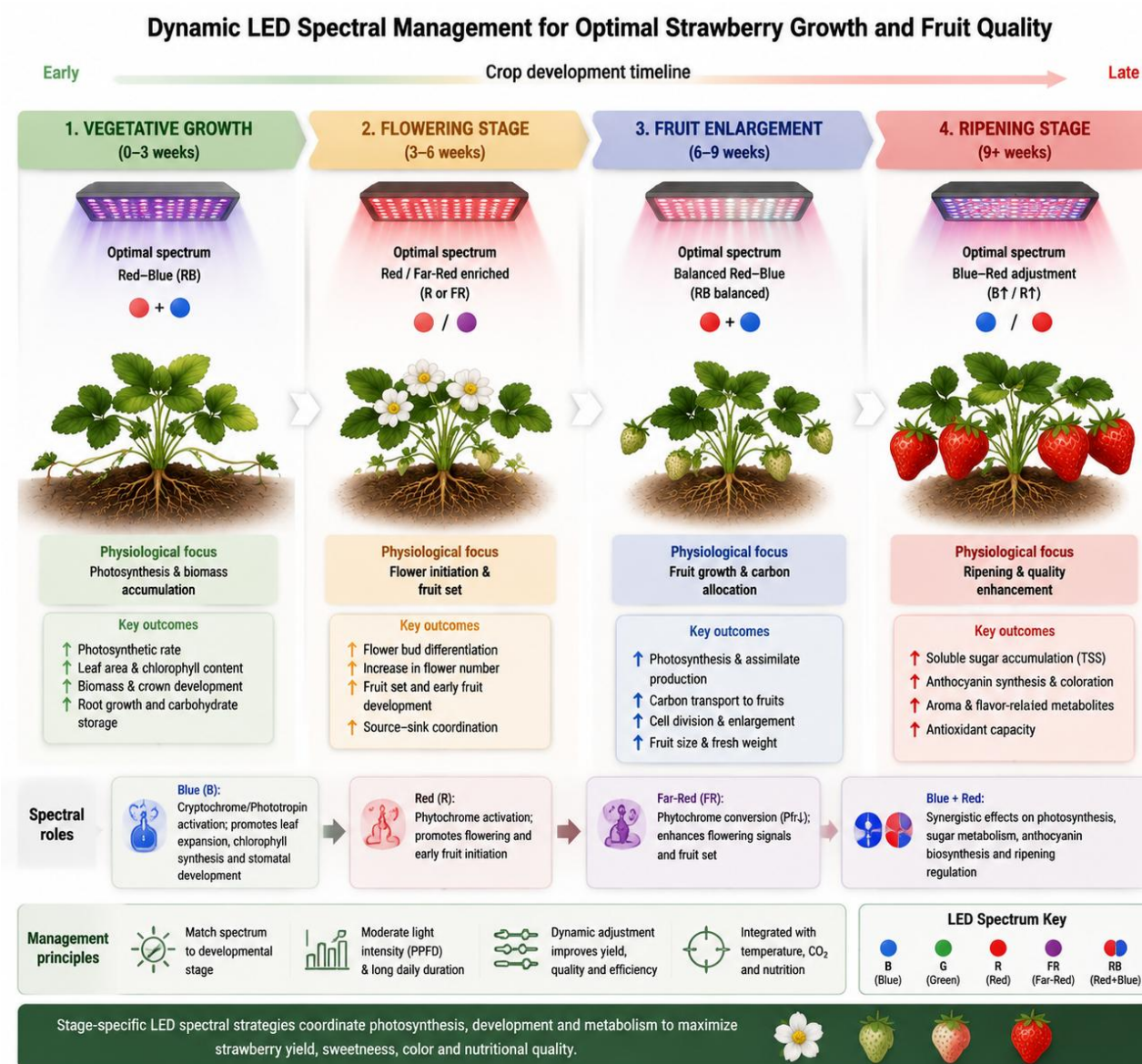


Figure 2 Developmental stage-specific LED spectral management strategy for optimizing strawberry yield and fruit quality

7.3 Canopy light optimization through leaf management and reflective mulching

Canopy light optimization depends both on plant architecture and on practices that increase fruit-zone light exposure. Field evidence shows that fruit light exposure changes strawberry flavor and antioxidant content, and that the magnitude of this response is cultivar-dependent, suggesting that leaf removal or canopy opening should be calibrated to genotype rather than applied uniformly. The same work found that cultivars maintained similar proportions of exposed fruit despite canopy-size differences by adjusting peduncle length, which highlights that canopy architecture itself influences how effectively management can redistribute light to the fruiting zone.

Reflective mulches provide a more direct case study of canopy light redistribution by increasing upward-reflected radiation into shaded fruit and lower canopy positions. In strawberry, highly reflective mulches increased growth and yield through larger fruit size and fruit number, and also increased ellagic acid and ascorbic acid concentrations, showing that improved reflected PAR can enhance both production and nutraceutical quality. More recent evidence indicates that mulch choice also affects fruit biochemical quality during ripening, with silver-black mulch outperforming paddy straw, black, and red mulches for fruit color and compositional traits, supporting reflective mulch as a practical tool for improving canopy light distribution and final fruit quality (Supreetha et al., 2024).