



Figure 3 Representative comparison of fruit appearance under ground-trailing and trellised cultivation systems

External size and mass may likewise benefit from combined trellis and floor management. In spaghetti squash, using both trellis and mulch gave the greatest number of fruits per plant and the largest fruit weight, while also supporting longer and wider fruits compared with other combinations, indicating synergistic effects of vertical support and soil surface protection on fruit growth (Kartika and Karyana, 2017). For bottle gourd, bower training significantly increased fruit length relative to ground trailing, even though fruit diameter could be slightly reduced, implying that supported systems may shift proportions toward more cylindrical, market-preferred shapes (Singh et al., 2023).

## 6.2 Effects on nutritional quality characteristics

Evidence from cucurbits and other trellised crops indicates that canopy architecture can alter internal composition, including sugars, acids, and secondary metabolites. In trellised acorn squash, fruits showed very high dry matter and soluble solids at harvest, and trellised plants had higher carotenoid, ascorbate, and antioxidant contents than ground-grown plants, reflecting enhanced accumulation of both energy reserves and health-promoting compounds (Adeeko et al., 2024). Similarly, in table grapes, a T-trellis system increased total anthocyanin, flavonoid, proanthocyanidin and monoterpene contents compared with a V-trellis, demonstrating that trellis geometry can modulate phenolic and aroma profiles important for nutritional and sensory quality (Wang et al., 2023).

Trellis-related changes in microclimate and sink–source balance can also influence basic quality indices such as soluble solids and titratable acidity. In greenhouse cucumber, training systems affected total soluble solids and potassium content: fruits from V-shape systems had the highest soluble solids and K, suggesting that certain vertical arrangements promote greater sugar and mineral accumulation. For sweet acorn squash grown on trellises,