The effect on flowering itself is not universally positive, and some studies show that reproductive timing remains highly genotype-dependent. In open-field comparisons, non-grafted CE showed the earliest first flower formation even though several grafted combinations later performed better for overall growth and yield traits (Musa et al., 2020). Reproductive expression after grafting also includes changes in seed set and fruit-setting characteristics, as shown by protected-cultivation work where certain combinations had the highest seed number, confirming that rootstock choice can modify reproductive allocation rather than simply increase vegetative vigor (Mozafarian et al., 2023). Therefore, grafting tends to improve effective fruit setting more consistently than it accelerates first flowering across all scions and environments.

4.2 Effects on fruit yield and yield components

The most consistent effect of grafting on eggplant yield formation is an increase in total and marketable fruit yield, especially when scions are combined with vigorous wild or allied rootstocks. Wild relative rootstocks increased total and marketable yield, fruit number per plant, and average fruit weight relative to non-grafted and self-grafted controls (Musa et al., 2020). Similar results were reported for commercial combinations grafted onto *Solanum torvum* or *S. aethiopicum*, where marketable yield increased by 31.4% and 20.0%, respectively, confirming that yield improvement is often expressed through both heavier fruits and more fruits per plant (Consentino et al., 2022).

Yield gains also appear under stress and under protected cultivation, showing that grafting stabilizes productivity rather than acting only in optimal conditions. Under deficit irrigation, grafted plants improved fruit yield by 12.7%-24.5% and reduced yield losses by 12%-44%, while under salinity, grafting onto SH increased total fruit yield mainly through higher average fruit weight (Wakchaure et al., 2025). Greenhouse and field studies likewise found large practical gains, including marketable-yield increases of 53.0% on *S. torvum* in greenhouse production and total fruit yield of 4 711.89 g/plant in the Pala/Köksal F1 combination in the field (Consentino et al., 2022). These responses are commonly attributed to improved water and nutrient uptake from stronger root systems, which increase reproductive support and raise the efficiency of fruit filling (Mauro et al., 2022).

4.3 Effects on fruit quality and nutritional characteristics

Fruit-quality responses to grafting are more variable than yield responses, but favorable combinations often improve commercial and nutritional traits. In one metabolomic and transcriptomic study, the Sm64R rootstock increased fruit size, yield, total soluble solids, phenolic acids, total amino acids, total sugar, and vitamin C, with associated changes in phenylpropanoid, phospholipid, and nucleotide metabolism (Yan et al., 2023). Other studies similarly found that grafting can increase ascorbic acid, chlorogenic acid, protein, potassium, and zinc, while lowering glycoalkaloids, indicating that some rootstocks enhance both nutritive value and functional quality (Consentino et al., 2022; Sabatino et al., 2022).

At the same time, quality outcomes are not uniform across cultivars, seasons, or rootstocks. Reviews and experiments agree that traits such as soluble solids, peel color, firmness, phenolics, and sensory properties can increase, decrease, or remain unchanged depending on the graft combination and environment. For example, grafting onto *S. torvum* sometimes reduced total phenolics or altered fruit color negatively, whereas other combinations increased total phenols, calcium, boron, zinc, and overall nutraceutical composition under more targeted nutrient management (Mauro et al., 2022). Overall, grafting improves eggplant yield formation most reliably through higher fruit number, fruit weight, and marketable yield, while fruit quality enhancement depends on selecting rootstocks that match the scion, environment, and production objective.

5 Role of Grafting in Enhancing Stress Resistance of Eggplant

5.1 Resistance to soil-borne diseases and pathogens

Grafting has become a central strategy for protecting eggplant against soil-borne pathogens because susceptible scions can be combined with rootstocks that express broader resistance than cultivated eggplant alone (Musa et al., 2020). This role is especially important in intensive production systems, where continuous cropping increases inoculum pressure and severe yield losses from bacterial wilt, Fusarium wilt, Verticillium wilt, nematodes, and