Effect of tree type and rootstock on the long-term performance of ?Gala?, ?Fuji? and ?Honeycrisp? apple trees trained to Tall Spindle under New York State climatic conditions

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In 2006, two 0.3 ha orchard trials were established at two sites (Dressel farm in Southeastern New York State and VandeWalle farm in Western New York State) to compare two tree types (feathered trees and bench-grafted trees) on five rootstocks [three Geneva® rootstocks (G.11, G.16, G.41) with one Budagovsky rootstock (B.9) and one Malling rootstock (M.9T337)] as controls. ?Gala? and ?Fuji? were used as scion cultivars at Dressel farm and ?Gala? and ?Honeycrisp? as the scions cultivars at VandeWalle farm. At each location, trees were planted at 3,262 trees ha?1 and trained to a Tall Spindle (TS) system. Location, tree type and rootstock interacted to affect tree growth, production and fruit quality of each scion cultivar. ?Gala? trees from VandeWalle (Western NY State) were more productive (33% more production) than those from Dressel Farm (Southern NY State), because they produced more fruits per cm?2 and fruit size was bigger. When comparing the two tree types (feathered and bench-grafted) at both locations and across all rootstocks (B.9, G.11, G.16, G.41, and M.9T337), feathered trees were similar in tree size after 11 seasons as bench-grafted ones, except for ?Fuji? at Dressel farm where bench-grafted trees were 27% smaller
than feathered trees. The bench-grafted trees had lower cumulative yield per hectare, cumulative yield efficiency, and cumulative crop load than the fully feathered trees. Finally, when comparing all 10 tree type × rootstock combinations, for ?Fuji?, feathered trees with G.11, for ?Gala?, feathered trees with G.41, and for ?Honeycrisp?, feathered trees with G.16 were the combinations with the highest cumulative yield, high yield efficiency and crop loads, low biennial bearing, and with slightly significant larger fruits.