

Mechanical harvesting of fruit - past achievements, current status and future prospects

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Abstract

Fruit picking is a tedious, time-consuming operation which accounts for the largest part of the labor employed in the production of fruit crops. Fruit picking requires decisions for selective harvesting (color, size and maturity) and maintaining high fruit quality throughout the picking process. Mechanization can reduce harvesting costs and dependence on seasonal labor so growers can stay competitive in the future by increasing harvest productivity in a timely fashion. However, fruit crops are affected by a diversity of factors such as climate, soil, market, utilization, fruit variety, tree or plant type and a lack of uniform maturity, all of which can slow the acceptance of substituted machines for human judgment and dexterity. This complexity has made commercial adoption of harvest machinery relatively slow. During the last 60 years of intensive R&D by industry, academia and the growers themselves, some significant implementation has occurred primarily with fruit destined for processing and/or fruit not sensitive to mechanical damage. Mechanical harvesting utilizes shaking of limbs, trunks and foliage of all nut crops, olives for oil, citrus for juice and grapes for wine, as well as deciduous fruit destined for processing that can tolerate a high level of mechanical stress including prunes, cling peaches and blueberries. A major hurdle to overcome in the future is the harvesting of soft, perishable fruit destined to the fresh market such as apple, pear and avocado. This will require a concerted effort and focused R&D on modifications of trees and orchard configuration along with further development of advanced technologies such as robotics, machine vision and artificial intelligence algorithms to facilitate selection of appropriate mechanization.