Growth retardants have great potential to balance between vegetative and reproductive growth. To assess the effects of prohexadione-calcium (Pro-Ca, Regalis) on reproductive and vegetative growth, return bloom, fruit set, and also fruit quality in ‘Golden Delicious’ apple grafted on M.9 rootstock, an experiment was performed during 2010–2012. The applications of 125 mg dm⁻³ Pro-Ca on the same trees in each year resulted in a 40–43% shoot length reducing. Internodes length decreased with Pro-Ca at about 30%, while total node number was unaffected. Results indicate that Pro-Ca applications have no effects on tree trunk growth, flowering, yield, fruit set and development. Pro-Ca also didn’t have any negative impact on fruit quality during the three consecutive years. Moreover, Pro-Ca resulted in higher fruit size compared to control in the third year of trial. The results of this experiment clearly suggest that fruit growers can use ProCa for the control of vegetative growth without having any negative effects on fruit quality and yield parameters. Once a full canopy has been achieved, annual shoot growth can be suppressed in the range of 20 to 30 cm with 125 mg dm⁻³ Pro-Ca treatment in ‘Golden Delicious’ apple trees.