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**A review on sustainable new fruit thinning strategies in apple growing.**

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**Abstract**

Most modern high-density orchard systems, including apples, have the goals of attaining sustainable, high yields with marketable fruit quality. Fruit quality is determined by size, skin colour and shape, as well as by other features such as internal quality (eg. sugar contents) and eating quality (e.g. crispness, juiciness). Fruit thinning is one of the most important cultural practices for the improvement of fruit quality. Fruits are thinned by hand, mechanically and chemically methods. Although hand thinning is the most reliability thinning method, it is much more expensive than any type of chemical fruit thinning. To reduce the labor costs, around the world, growers have been using chemical-synthetic thinning agents or plant hormones, such as dinitro compounds, NAA (Naphthalene Acetic Acid), NAAM (Naphthalene Acid Amid), carbaryl, etephon and GA<sub>3</sub> (Gibberelic Acid). Whereas, using of these chemicals is not allowed in certified organic apple growing. So, alternative thinning strategies are need for use in organic apple orchards. For this purpose, many researchers tested different potential thinning compounds such as plant oils, ATS (Ammonium thiosulphate), lime sulphur, starch, sodium bicarbonate, sodium salt, soap and kaolin, which are considered safe for the environment and human health.

**Keywords:** Thinning, fruit quality, *Malus x domestica*, organic growing.