

Thinning by shading: economic benefit for organic apple growers?

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Abstract

In the last years, the organic apple production has increased in Europe. In Italy, Austria and Germany for example the organic apple area increased of about 200 ha in each country. With the increase of offer and with the possible stagnation of demand only fruit with high quality standards will be sold. Quality standards are also influenced by the exigencies of retailers (for example discounter supermarkets chains). Surface productivity (yield) and quality are then going to be more important key factors for organic growers. With the correct thinning method it is possible to control yield and quality in apple production.

Organic fruit growers are not allowed to use chemical thinning. Mechanical thinning with the thinning-machine is also an option for fruit growers. Though this technique is not adaptive to all the orchards; the tree form of the apple orchard should match with the mechanical thinning. To regulate the yield and improve the quality numerous hand thinning hours are needed.

Thinning by shading is an innovative technique which can be used in organic production to regulate yield and improve quality. With this study we will evaluate the economic benefit for growers by using this technique and compare the cost allocation in different thinning techniques used in organic production.

Keywords: apple, thinning by shading, organic production, quality

Introduction

The organic apple production area in Western Europe increased significantly in the last three years. From 2007 to 2009, there was an increase of 200 ha in Italy (ZMP, 2008), 200 ha in Austria (Wilhelm, 2008), 200 ha in Germany (ZMP, 2008) and 90 ha in France (Agence Bio, 2009). In the next years the offer of organic apples could increase even more and with a possible stagnation of demand only fruit with high quality standards will be sold as dessert apples. Also more apples are sold by discounters. In Germany for example in the year 2007/2008 28% of the organic apples were sold by discounters (Kasbohm 2009). This can also influence the quality standards of the organic apple production.

Chemical thinning is a cost-effective method to control the quality and regularity of apple yield. However, chemical thinning is not allowed in organic production.

During six years the Research Station Agroscope Changins-Wädenswil ACW run attempts in the implementation and impact of the thinning by shading.

Different field trials with the cultivars Golden Delicious, Elstar and Topaz during two years (2006 and 2007) showed, that the thinning by shading can regulate the crop load to the necessary extent with the achieved fruit quality (Kockerols et. al. 2008).

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The cultivars responded differently to the length of shading:

For Golden Delicious and Topaz three days of shading reduced fruits per 100 flower clusters to a satisfactory extent. Seven days shading at 25 days after full bloom resulted in a good thinning effect for Elstar.

In the following year flower count showed a reduction in alternate bearing for the shaded trees (Kockerols et al. 2008). With the results from these trials Kockerols et al. (2008) could demonstrate that the response of the thinning by shading to meteorological conditions seems to be surprisingly low. Results showed that date and length of shading seemed to be more important.

The temporal limited and correct dosage of the shading leads to an optimal fruit load comparable to chemical thinning. This new technique could be used by organic growers as an effective thinning method in apple production. The important question is if this technique is also interesting for farmers from an economical point of view.

Material and Methods

To evaluate the cost-effectiveness of thinning by shading we compare the costs of the following three thinning techniques:

- Thinning by shading;
- Hand thinning;
- Mechanical thinning.

We determinate the additional costs to a standard organic production due to material machine and labour for all three observed techniques. To evaluate the costs for the shading technique we measured during the trials the additional working and machines hours. The costs for material are the real costs for the nets (Agroflor, 2007), wire and plastic tags (Thurella, 2009) and were evaluated using praxis data. To evaluate the additional labour hours of the hand thinning techniques and the mechanical thinning we used On-farm data and experts evaluations. To compare all three different techniques we assumed that yield and profit (yield x price) for each technique are on the same level (*ceteris paribus*). Hourly wage rate were determined using references of the Swiss Fruit Union (2009) and the hourly rates for machines and tractors were calculated according to Gazzarin and Albisser Vögeli, (2009).

Results

For the three different thinning techniques we calculated following costs:

Thinning by shading:

The additional annual costs (amortisation and interests) for the shading nets (incl. nets, wire and plastic tags) are 2'760 €. The specific calculated machine costs (auto-hoist and tractor) are 226 € (23 h/year auto-hoist with a specific rate of 9 €/h (ART, 2009) and 1 h/year tractor with a specific rate of 23 €/h). The annual labour costs to apply the shading net (measured 52 h/year) add up to 910 € (with hourly wage rate of 17.5 €/h).

Hand thinning:

With the evaluation of experts and on farm data we could estimate that the additional annual hand thinning hours that growers need to achieve satisfying quality and to prevent alternate bearing by using only hand thinning are about 300 h/year. The additional costs for hand thinning add up to 5'250 € (with hourly wage rate of 17.5 €/h).

Mechanical thinning:

With the evaluation of on farm data we could estimate that the additional working and tractor hours each are 2 h/year. The additional costs are 46 € for labour (with hourly wage rate of 23 €/h for the farm manager) and the additional tractor costs are 145 € (with rate of 72.5 €/h for the thinning machines and the tractor).

Table 1: Additional annual costs for three techniques (based on 1 ha)

	Thinning by shading	Hand thinning	Mechanical thinning
Material	2'760 €		
Machine	230 €		145 €
Labour	910 €	5'250 €	46 €
Total additional costs	3'900 €	5'250 €	191 €

The hand thinning has the higher total additional costs. Farmers that want to prevent alternative bearing and improve fruit quality have to invest more labour hours in the hand thinning with higher additional costs. The thinning by shading is compared to the hand thinning less expensive. However, mechanical thinning is the less expensive thinning technique for organic growers, but needs additional quality thinning in later season.

To reduce the additional costs for thinning by shading it is possible to coordinate between early and late cultivars within an orchard. Thus, material will be saved because shading nets can be used twice within an orchard. With this option the additional costs for thinning by shading will be reduced to 2'550 € per year and will consequently be about half of the additional costs compared to the hand thinning technique.

Discussion

Today, organic fruit growers are able to compensate the economical loss caused by alternate bearing and low quality with higher apple prices (80 %) (Fricke et. al, 2009). With a possible saturated organic apple market and the consequences of discounters entering in the market for organic fruits also the price for organic apples could drop and/or the quality standards for organic apples could become more stringent. By improving the thinning techniques apple growers can ameliorate the fruit quality. Organic growers have only few alternatives for a cost-efficient thinning method today. The hand thinning method is very labour intensive and increases the production costs (of about 20% with yearly production costs of 23'000 € per hectare). The use of the thinning machine is a very interesting option from the economical point of view. However, only orchards with thin trees can be used for this thinning technique. In later season additional quality thinning is always needed by using the thinning machine. For orchards where the thinning machine doesn't show the expected results, the use of shading nets could be an interesting option. However, only with adequate know-how can the grower reach the expected results. Also this thinning technique – like all thinning methods – is not easy to use and leads only to success when implemented with the due precaution and knowledge.

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