EVALUATION OF APPLE CULTIVARS FOR SUSTAINABLE FRUIT PRODUCTION

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Abstract

In the spring of 2007, two-year-old scab-resistant or partially scab-resistant apple cultivars grafted on M.9 rootstock were planted in the SC. Dellifood SRL, apple orchard, at Urvind, near Oradea in vest of Roumania. The cultivars evaluated were , 'Rubinola', 'Topaz', 'Goldstar', Rajka, Otava. While in the orchard, the trees were evaluated in terms of their suitability for sustainable fruit production. The experimental plot was divided into two halves. In one half, no chemicals were applied to either the trees or the soil. In the other half, only those chemicals which are allowed for use in sustainable fruit production were applied in limited amounts in order to control pests and diseases. After planting, tree rows were mulched with agricultural spun-web, linen residue felt, or sawdust in a 1.2 meter wide strip. Grass was allowed to grow between the rows and was regularly mown.

While in the orchard, the trees were evaluated in terms of their suitability for sustainable fruit production. Trees mulched with spun-web and linen residue felt grew better and bore earlier than trees mulched with sawdust. In both years of the trial, 'Rubinola' and 'Topaz' had the largest trunk cross-sectional area, but produced long, bare shoots, which made training difficult. 'Rubinola', 'Topaz', 'Rajka bore fruits of acceptable eating quality. The other cultivars bore poor quality fruits.

Based on the two-year trial, 'Rubinola',Otava 'Topaz' and 'Rajka are the scab resistant apple cultivars most suitable for sustainable fruit production in modern orchards.

In the first two years of the trial, apple scab was not observed, probably because of the dry growing seasons. Damage by spider mites and codling moths was not economically significant. A homemade extract of nettles was not effective in controlling aphids.

Key words: apple, scab resistant cultivars, tree vigor, fruit quality

INTRODUCTION

When a new orchard is being planted, growers often select cultivars which are resistant to apple scab . Growing scab resistant apple cultivars reduces the need for chemicals, which helps protect the environment .

Scab resistant apple cultivars are becoming more and more popular in the European Union. The new scab resistant cultivars taste good. '*Topaz'*, *'Rajka'* '*Rubinola'Otava* and '*Goldstar'* are valuable scab resistant cultivars from the Roumania.,. The aim of this trial was to select the scab resistant cultivars which are most suitable for sustainable fruit production in modern orchards.

MATERIAL AND METHODS

In the spring of 2007, two-year-old scab-resistant or partially scab-resistant apple cultivars grafted on M.9 rootstock were planted in a podsolic soil overlaying heavy clay in the Experimental Orchard at Urvind, near Oradea in vest Roumania. The cultivars evaluated were '*Rubinola'*, *'Topaz'*, *'Goldstar'*, *Rajka*., *Otava*. The trees were planted 4.00 x 1.20 meters apart and trained as slender spindles.

The trial was set up in a randomized block pattern with four replications of three trees each. The experimental plot was divided into two halves. In one half, no chemicals were applied to either the trees or the soil. In the other half, only those chemicals which are allowed for use in sustainable fruit production were applied in limited amounts in order to control pests and diseases. After planting, tree rows were mulched with agricultural spun-web, linen residue felt, or sawdust in a 1.2 meter wide strip. Grass was allowed to grow between the rows and was regularly mown. No mineral fertilization was ever applied to any part of the orchard.

While in the orchard, the trees were evaluated in terms of their suitability for sustainable fruit production. Tree trunk diameter was measured 25 cm above ground level and converted to trunk cross-sectional area. The yield of fruit per tree and the mean fruit weight were also recorded for each year.

Results were statistically elaborated by analysis of variance, followed by Duncan's multiple range t-test at P = 0.05

RESULTS AND DISCUSSION

Trunk cross-sectional area, yield and mean fruit weight in scab resistant apple cultivars

Trees mulched with spun-web and linen residue felt grew slightly better and bore earlier than trees mulched with sawdust. In both years of the trial, , '*Rubinola*' and *'Topaz'* had the largest trunk cross-sectional area, but produced long, bare shoots, which made training difficult (*Tab. 1 and 2). Rajka* was also very vigorous. *'Goldstar'*, were the least vigorous. This agrees well with earlier reports of tree vigor on M.9 rootstock .

Tabel 1

Trunk cross-sectional area, yield and mean fruit weight in scab resistant apple cultivars

Cultivar	Spraying	Mulching material	Trunk cross-sectional area [cm^2] 2007	Yield [kg/tree] 2006-2007	Mean fruit weight [g]
'Rubinola'	none	spun-web	5.48 b	1.70 b	190
		linen felt	4.19 a	1.13 ab	150
		sawdust	4.94 a	0.81 a	160
	limited	spun-web	7.36 b	0.96 a	210
		linen felt	5.12 a	0.85 a	160
		sawdust	6.03 ab	0.63 a	200
'Topaz'	none	spun-web	4.69 a	0.22 a	120
		linen felt	4.91 a	2.70 b	140
		sawdust	5.01 a	1.71 b	130
	limited	spun-web	5.12 a	2.82 a	150
		linen felt	5.04 a	2.05 a	140
		sawdust	5.56 a	2.62 a	150
'Goldstar'	none	spun-web	3.61 b	1.10 a	190
		linen felt	2.84 a	0.72 a	140
		sawdust	2.92 a	1.19 a	160
	limited	spun-web	3.61 a	0.99 a	190
		linen felt	3.41 a	0.99 a	130
		sawdust	3.84 a	1.25 a	220
Rajka	none	spun-web	7.45 a	2.33 b	190
	limited	spun-web	7.00 a	1.24 a	220

*Means followed by the same letter do not differ significantly according to Duncan's multiple range t-test at P=0.05

Trunk cross-sectional area, yield and mean fruit weight in scab resistant apple cultivars Experimental Orchard Oradea

Table 2

Cultivar	Spraying	Mulching material	Trunk cross-sectional area [cm^2] 2007	Yield [kg/tree] 2006-2007	Mean fruit weight [g]
Goldstar	none	spun-web	4.62 a	1.62 a	180
	limited	spun-web	4.38 a	2.08 a	200
Otava	none	spun-web	3.85 a	3.66 a	160
	limited	spun-web	4.44 a	4.87 b	180
Topaz	none	spun-web	7.45 a	2.33 b	190
	limited	spun-web	7.00 a	1.24 a	220

CONCLUSIONS

'*Topaz*' had the highest yield, and ', '*Goldstar*' ,'*Rubinola*' had the lowest yields. '*Rubinola*' and '*Topaz*', bore fruits of acceptable eating quality with a low susceptibility to decay. The other cultivars bore poor quality fruits. This agrees with earlier reports stating that organically grown fruit is usually inferior in eating quality to commercially grown fruit .

'*Topaz*', '*Goldstar*' and *Otava* bore apples that are much too small to meet the demands of modern consumers.

Based on the two-year trial, '*Rubinola*' and'*Topaz*' are the scab resistant apple cultivars most suitable for sustainable fruit production in modern orchards.

Apple scab was not observed in either year of the trial, probably because of the very dry growing seasons. Powdery mildew was easily controlled by pruning infected shoots. Damage due to spider mites was not economically significant. Spraying with carpovirusine ensured that the percentage of apples damaged by codling moths was insignificant. A homemade extract of nettles was not effective in controlling aphids.

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