

The influence of farming systems on the harvest of apple tree orchards and the chemical composition of apples

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Summary:

Research of apple productivity and quality was carried out in organic and intensive farming in northern and central Lithuania gardens. Standard analysis and several new methods were used to analyse apple productivity and quality. Apples grown in the same climate and soil conditions using organic farming technologies were characterised by better taste and transport features and better electrochemical parameters, but the yield is less and fruits have an inferior marketable look.

Introduction:

The aim of organic farming is – to produce healthy products with high quality. In Lithuania there are 369 hectares of certified organic orchards. Research of the farming system impact on apple tree orchard yield and quality has been conducted in 2003 and 2004 to clarify the feasibility of organic farming system production conditions, quality of fruits without artificial measures and reduction of pollution on the environment.

Research objectives:

The object of research was three varieties of *Malus* genus plant fruits in certified organic and conventional farms (Biržai r.) and in Kaunas College, Faculty of Land Management demonstration pomological orchard (Kaunas r.). To guarantee objectivity of data comparison, the investigation for the same varieties of apples was planned in the neighboring orchards.

Research methods:

- Phenological observation of the vegetation beginning, intensity of blooming, ripeness at harvest, evaluation of trees and fruits lesion with diseases and pests and assessment of testing kinds productivity set by G.A. Labanov.
- Soluble dry material set with refractometer, sugar – set with Bertran method, vitamin C – titration with solution of 2,6 dichlorophenolindophenol sodium saline, dry material – gravimetric method, withered up in 105° temperature till equable weight, nitrates – potentiometric method, with ionic-selective electrode, titration acidity – titration with 0,1 N sodium alkali, skin firmness was investigated on samples of 10 fruits by IDP-500 penetrometer with the tang diameter of 1,0 mm, tissue firmness was investigated on samples of 10 fruits by FT 327 penetrometer with the tang diameter of 11,3 mm, variance of analysis was evaluated by the program “ANOVA” and “DISVEG” for EXCEL vers. 3.43, (author - Dr. Pavelas Tarakanovas)

Results:

Disparity in injury by scab during vegetation has been observed in apple trees *Auksis*. Level of leaf injury by scab has been evaluated by 3 points, fruits – by 4 points in organic farming system variant, while in conventional variant accordingly – 0 and 1

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points. Because of strong injury by scab in organic production was set 46 % of extra quality production, in conventional – 78%.

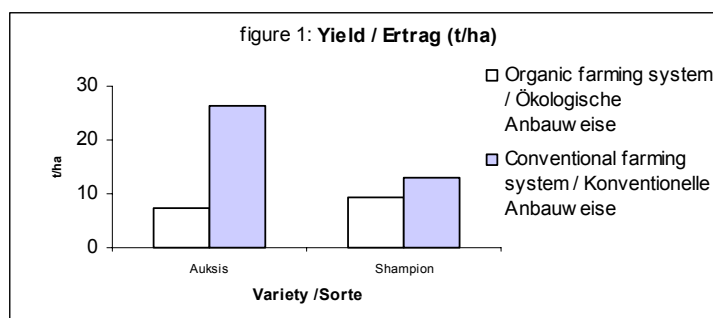
There was almost no difference in scab injury of *Shampion* variety of fruits. Essential differences of shoot growth have been estimated in the conventional variant of the *Shampion* variety. Typical for variety differences in colour and time of maturity were estimated. Fruits in organic farming gathered typical colour and reached picking maturity faster.

Productivity of organic *Auksis* and *Shampion* varieties were estimated with lower statistical reliability difference, comparing with the conventional farming system (1 example).

Data about fruit skin and tissue firmness were statistically reliable but comparing separate varieties, the *Shampion* variety of fruits had better features.

Main differences between variants were set during examination of fruits in soluble and dry material quantities of both varieties. In organic fruit more of these materials were investigated.

There were almost no differences of vitamin C and quantity of nitrates in both varieties and variants. Sugar quantities were different in all varieties. Total sugar and saccharose differences in the organic *Shampion* variety were substantial, in the conventionally grown *Auksis* variety, there was reliably more saccharose.



Conclusions:

According to one year's tentative data these conclusions have been made:

- Quality of organic apples is influenced by genotype features, and apple trees *Shampion* have better harvest and biochemical features;
- Even though conventional production of gardens certainly had better apple harvest, organic apples had better transportable qualities and resistance to mechanical injury;
- Analysing soluble dry material, dry material and titration acidity data we can make the assumption that organic apples have better technological features;
- In organic farming conditions apples reached picking ripeness earlier

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