

RESEARCH ARTICLE

Growth, Yield and Fruit Quality of Grapevines under Organic and Biodynamic Management

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Abstract

The main objective of this study was to determine growth, yield and fruit quality of grapevines under organic and biodynamic management in relation to integrated viticultural practices. Furthermore, the mechanisms for the observed changes in growth, yield and fruit quality were investigated by determining nutrient status, physiological performance of the plants and disease incidence on bunches in three consecutive growing seasons. A field trial (*Vitis vinifera* L. cv. Riesling) was set up at Hochschule Geisenheim University, Germany. The integrated treatment was managed according to the *code of good practice*. Organic and biodynamic plots were managed according to Regulation (EC) No 834/2007 and Regulation (EC) No 889/2008 and according to ECOVIN- and Demeter-Standards, respectively. The growth and yield of the grapevines differed strongly among the different management systems, whereas fruit quality was not affected by the management system. The organic and the biodynamic treatments showed significantly lower growth and yield in comparison to the integrated treatment. The physiological performance was significantly lower in the organic and the biodynamic systems, which may account for differences in growth and cluster weight and might therefore induce lower yields of the respective treatments. Soil management and fertilization strategy could be responsible factors for these changes. Yields of the organic and the biodynamic treatments partially decreased due to higher disease incidence of downy mildew. The organic and the biodynamic plant protection strategies that exclude the use of synthetic fungicides are likely to induce higher disease incidence and might partially account for differences in the nutrient status of vines under organic and biodynamic management. Use of the biodynamic preparations had little influence on vine growth and yield. Due to the investigation of important parameters that induce changes especially in growth and yield of grapevines under organic and biodynamic management the study can potentially provide guidance for defining more effective farming systems.

Introduction

The negative impact of agriculture on the environment has increased since agricultural production intensified [1,2]. Organic farming systems with their holistic approach can be seen as a