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The development of innovative technologies and products for organic fruit production. An integrated project.

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Abstract

Organic production in Poland is rapidly developing due to the increased demand of domestic market and from other EU countries. However, these increases in organic production are mainly occurring in annual crops and pastures, while fruit and vegetable production has encountered more difficulties in widening their market share due to limited availability of technical means of production. The higher level of technical knowledge necessary to conduct an organic orchard is also a constraint for the development of the sector. An integrated, five-year project aiming at the development of technologies and technical inputs focused on three major Polish fruit crops (apple, strawberry and sour cherry) has been funded under the EU Regional Development Fund through the Innovation Economy Operational Program. It involves the Research Institute of Pomology and Floriculture of Skierniewice and the Medical Universtity of Łodz which will carry out research in collaboration with the Institute of Plant Protection (Poznan), the University of Warsaw and the Polytechnic of Koszalin. The project takes an integrated approach that includes: isolation and selection of rhizosphere microorganisms useful for enhancing plant nutrition capacity, development of new inputs and new machines for their efficient application, optimization of nursery and orchard soil management practices, evaluation of the quality of organic fruits through the analysis of pro-health and nutraceutical compounds, analysis of the effect of organic fruit consumption on human health, and economical analysis of the application of the new technologies. A project Web page and dissemination of results are also planned.

Introduction

Organic farming is considered an important component of the Polish and EU strategies for developing the agricultural sector, because of its contribution to environmental protection and sustainable food production (Willer and Yussefi 2007).
The production of organic fruits is becoming progressively more interesting in Poland (Anon. 2007) and in the entire EU due to increased consumer awareness and shifting demand patterns. However, the need for a high level of technical knowledge together with the limited array of orchard management inputs available in Poland are serious bottlenecks constraining the future development of the sector.
Rhizosphere microorganisms are a crucial component of plant-soil relationships and are involved in several processes linked to plant nutrition. Their exploitation to increase the sustainability of agricultural production has steadily expanded (Azcòn-Aguilar and Barea 1997). In particular, arbuscular vesicular mycorrhiza (AMF) and plant growth promoting rhizobacteria (PGPR) are attracting attention as important groups of agriculturally beneficial microorganisms. Some products based on these organisms are already being marketed and have become available worldwide (Rao Podile and Kishore 2006). However, the majority of studies and the selection of beneficial strains have been conducted on annual crops (Ortaş and Varma 2007).
Application of beneficial microorganisms for the management of organic orchards is in line with the holistic approach, which is the basis of organic farming. Recently, some efforts have been started also in breeding new varieties for rhizosphere-related traits (Wissuwa et al. 2008). However, there is a need to optimize the formulation of microbial products, to enhance their efficacy, and to adapt machines and application techniques to the needs of perennial crops.
An integrated, five-year project aiming at the development of technologies and technical inputs for organic fruit productions, focused to the three major Polish fruit crops (apple, strawberry and sour cherry) has been funded under the EU Regional Development Fund through the Innovation Economy Operational Program. This paper provides information on the project aims and activities.

Project description

The project is conducted by the Research Institute of Pomology and Floriculture in Skierniewice and the Medical University of Łodz, which will carry out research in collaboration with the Institute of Plant Protection (Poznan), the University of Warsaw and the Polytechnic of Koszalin. The planned activities include:

1) isolation and selection of rhizosphere microorganisms (mainly arbuscular vesicular mycorrhiza and plant growth promoting rhizobacteria) that will be gathered to constitute a bank of strains suitable for fruit crops;
2) development of new technical means of production for plant nutrition management, based on microbial inocula and organic raw materials;
3) optimization of methods and products for the biological control of major pests and diseases of the concerned fruit species;
4) improvement of methods and technologies for management of nurseries and orchards, specifically related to plant nutrition;
5) design of machines to increase the application efficiency of fertilizers, soil conditioners and plant protection products;

6) evaluation of the quality characteristics of organic fruits, with particular attention to their pro-healthy and nutraceutical properties, also after storage;
7) appraisal of the effect of the consumption of organic fruits on human health, through both *in vitro* and *in vivo* studies involving voluntary consumer panel tests;
8) economic assessment of the introduction of the new technologies and their market feasibility.

Much effort will be dedicated to disseminating and spreading information about the developed technologies and practices, as well as other technical aspects related to organic fruit production. This activity, carried out in collaboration with the National Advisory Centre for Organic Farming, will comprise several workshops, open days and demonstrations. The project will also establish a webpage (www.insad.pl/EkoTechProdukt.html), which will serve as a source of information about project activities.

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