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Consortium of probiotic microorganisms as biocontrol agent of pests and diseases on hops

Solarska Ewa
University of Life Sciences in Lublin, Poland

In the years 2007-2010 field studies were carried out to elaborate the plant protection against diseases and pests for organic hop production by using Probiotics microorganisms (PM). PM protected hops against downy and powdery mildews and also against main pests i.e. aphids and spider mites, especially in year with low population of these pathogens and pests. Protection of hops by organic methods such as use of PM fermented with plant extracts is effective and this way of hop protection has similar efficacy to quasia in aphids control, to whey in two spotted spider mites control and to Mycosin in downy and powdery mildews control. Good protective effects against hop aphids were obtained when PM in mixture with PM fermented common sow-thistle; common dandelion and tansy extracts were applied.

Keywords: hops, organic farming, diseases and pests control, Probiotics microorganisms, fermented plant extracts

Introduction: Biological control offers an environmentally friendly alternative to the use of pesticides for controlling plant diseases and pests. The plant probiotic microorganisms have been commercially developed for use as biopesticides or biofertilizers. These microorganisms have fulfilled important functions for plant as they antagonize various plant pathogens, induce immunity, or promote growth (Berg 2009). Probiotics Microorganisms (PM) are used more and more often in organic farming. Based on the principles of efficient and beneficial microorganism (EM) SCD Probiotic Technology is developed in USA by Matthew Wood. Consortium of microorganisms consisting mainly of lactic acid bacteria, photosynthetic bacteria, yeast and *Actinomyces* which co-exist for the benefit of whichever environment they are introduced. A primary advantage of these microbes is that they can compete with and eliminate pathogenic microorganisms from a system. They achieve this by occupying the niche that a pathogen would occupy or by producing substances that kill or damage pathogen cells and break down toxic substances. Beneficial microorganisms produce bioactive substances such as vitamins, hormones, enzymes, antioxidants and antibiotics that can directly or indirectly enhance plant growth and protection these results in lower populations of pathogens, lower concentrations of toxic compounds produced by pathogens and therefore lower incidence of disease. Each of these probiotic microorganisms has a specific task. In addition, these microorganisms enhance each other i.e. they act synergically. The microorganisms naturally exist and are not modified or manipulated in any way and are cultured according to specific methods. The impact of PM in promoting plant growth by controlling or suppressing pests and diseases has been reported from many countries (Boligłowa and Gleń 2008, Robotic *et al.* 1999, Tokeshi *et al.* 1998).

For the control of pests and diseases on plants cultivated in organic farming, plant extracts have used very often (Solarska 2004). Some of the substances in extract involved in plant defense mechanisms may help to enhance the resistance of crops through structural strengthening of the plant, increasing its resistance to the penetration of fungal mycelia and sucking insects such as aphids, or through encouraging vigorous growth to overcome an attack, or by direct toxicity (Lampkin 2002). The fermented plant extract is also used to enhance efficacy of PM in plant protection against diseases and pests (Daly, *et al.* 2000, Kyan *et al.* 1999).

The aim of this study was the arrangement of plant protection against diseases and pests for organic hop production by using PM and the comparison of plant protection against diseases and pests for organic hop production based on quasia, MycoSin and whey with protection based on PM enhanced fermented plant extracts.

ewa.solarska@up.lublin.pl