

Ecological tomato seed treatment assays

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Abstract

EU decree No. 2092/91 deals especially with ecological plant cultivation, and regulates reproduction and usage of seed and propagation material (EC Council Regulation on Organic Agriculture article 6, No. 2092/91). According to EU decree No. 1452/2003 (14 August, 2003), the use of ecological propagation materials is obligatory in organic farming.

Application of synthetic dressing powders protecting propagation materials is not permitted. However, high quality healthy seeds are essential for successful organic farming. The aim of our study is to find new, environmentally friendly treatments.

In Hungary, bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*) of tomato has caused high yield losses in tomato production since 1960, while bacterial speck (*Pseudomonas syringae* pv. *tomato*) is just a sparse problem. In ecological farming systems, a maximum of 1.5% Sodium-hydroxide is allowed to use against these diseases; however it is a disinfectant, so currently there is no seed dressing material allowed in ecological farming in Hungary.

Acetic acid is still examined in other countries as seed treating material, but it was applied just against fungi in arable cultures. Other examinations also developed new adequate methods for seed treatment in ecological vegetable production, including natural compounds, antagonistic microorganisms, and physical treatments. Seed dressing with alkaline materials is used in agriculture; the action of it is to change the pH on the seed surface.

Examined bacterial strains originated from NCAIM, Hungary. These were: *Pseudomonas syringae* pv. *tomato* B.01277, B.01682, B.01538; *Xanthomonas campestris* pv. *vesicatoria* B.01771, B.01226; and *Clavibacter michiganensis* subsp. *michiganensis* B.01778, B.01779.

Bacteriological examinations were made by cup plate- and disc method. Examinations were made in four replicates. Data have been analyzed by SPSS 14.0 program (Tukey b, Duncan, Games-Howell test (SD 5%)).

Germination ability was examined with an ISTA standard (MSZ 6354-3: 1991) in the National Institute for Agricultural Quality Control in Hungary. The germination ability test was made with 100 seeds in four replicates. Before the test, the seeds were soaked in materials for 10 minutes and then they were dried. Data have been analyzed by SPSS 14.0 program Duncan test (SD 5%). GC-MS chromatography was used to identify active ingredients of examined essential oils. The examination was made by Corvinus University of Budapest, Department of Medical and Aromatic Plants.

Results showed that examined bacterial strains were more sensitive to acidic than alkaline circumstances. The lowest examined concentration (0.5 %) of vinegars had also bactericide impact. Acetic acid is a natural substance with low oral toxicity to humans, birds, and others who have contact with it. Other examinations showed acetic acid to have an inhibition effect against fungi, too, so they seemed to be promising in this field according to the examinations.

Among examined essential oils, the most effective was cinnamon oil. Thyme oil was also effective, but to a lesser extent than cinnamon oil. According to literature, cinnamon was effective because of cinnamon aldehyde content, and our GC-MS examinations showed the same result. The thyme oil was effective because of thymol content.