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The influence of plant extracts and macerates on the health status of some tomato varieties grown in an organic system

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Abstract: *Diseases in tomato crops are a serious problem both in greenhouse and field production. The main problems in controlling tomato diseases are the lack of adequate control compounds. Using herbal extracts is an environmentally friendly and increasingly popular approach to fighting disease. There are a variety of plants with antifungal, antibacterial, or antiviral properties that can be very helpful. Several natural substances have been proposed as an alternative to synthetic compounds, such as propolis and volatile oils from various plants, extracts, and macerates from plants from the spontaneous flora. The concentration of the extract and the frequency of applications may vary depending on the extract used, the disease targeted, and the severity of the infection. In general, extracts are diluted in water and applied by foliar spray.*
The effectiveness of herbal extracts may vary depending on environmental conditions, tomato variety, and other factors. It is recommended that you test different extracts and concentrations to determine the most effective method for your specific situation. Preventive application of extracts may be more effective than treating advanced infections.
Keywords: *diseases, bioactive compounds, environmental protection.*

Introduction: In tomato crops, as mentioned by IACOB, 2010, 35 parasitic diseases have been reported and described, of which: 6 viruses, 4 mycoplasmas, 7 bacterioses and 18 mycoses. The incidence of the attack of the causative pathogens is different and also influenced by: the cultivation area, the type of crop (field or controlled spaces) and its destination (seedling production, consumption, industrialization, seed production). For a very long time, the only way to combat and maintain under control the damaging agents was the use of numerous synthetic pesticides, which, when used for a long time, led to the development of resistant forms (ROSSLENBROICH and STUEBLER, 2000). Consequently, many
New families of fungicides, herbicides and insecticides continue to be introduced on world markets in the form of compounds, losing their popularity due to pest resistance or adverse health effects. As ENEA, 2009 mentions, synthetic pesticides still remain an important tool in the integrated management of agricultural pests and, despite the negative aspects on the environment and humans, they will prevail for a long time.
Organic farming emerged as an alternative to conventional agriculture, practiced intensively, using large quantities of production stimulants to continuously increase the product.
Today, efforts are being made around the world to replace some chemicals with safer alternatives that do not cause toxic effects on the environment. One of the alternatives is the use of natural phytopharmaceutical products.

Materials and methods
The health of tomatoes grown in the system was assessed through visual checks, which looked at the attack of data organizations specific to tomato culture in closed spaces (Phytophthora infestans, Leveillula taurica, Mycovellosiella fulva, Botrytis cinerea and Alternaria solani). To keep pathogens under control in an ecological system, during the two years of research (2023 and 2024), experiments were set up to monitor the biological efficacy of the products presented in Table 1.
To obtain the macerate, the following quantities of plants were used: 300g of horsetail (Rhus typhyna), 50g of fern (Dryopteris filix-mas), 50g of basil (Basilicum officinalis), 100g of horsetail (Equisetum arvense), 100g of stinging nettle (Urtica dioica). The chopped plants were placed in 10 l of water and left for 4 hours at room temperature.
For the alcoholic extract, the same plants were used, in the same quantity, the water being replaced with a 2% alcohol solution, the time required for extraction increasing to 48 hours.
The preparations (fig. 1) were filtered and immediately administered manually, using a Solo pump.
For the attack of pathogens detected in the culture, the frequency (F %) and intensity (I %) were noted, in order to calculate the degree of attack (GA %).

Table 1: Products used in the prevention and control of pathogens and animal pests from tomato

Nr. crt.	The product used	The role of treatment
1	Alcoholic herbal extract	Preventing the attack of fungal pathogens
2	Bordeaux juice 0.6%	Combating and preventing the attack of fungal pathogens
3	Herbal macerate	Preventing and combating the attack of fungal pathogens

Fig. 1. Products used to combat and prevent attack by pests (original)

RESULTS AND DISCUSSIONS

To ensure a good phytosanitary condition of the plants, technological factors were combined with biological ones (varieties) and, to prevent and combat the attack of phytoparasites, treatments with natural products (macerate and alcoholic extract of plants obtained cold), alternated with treatments with a cupric product (Bordeaux mixture), applied at different dates, were carried out tab. 3).

Table 2: The influence of treatments to attack pathogens tomatoes grown organically

Variety	Phytophthora infestans	Leveillula taurica	Mycovellosiella fulva	Botrytis cinereea
Variety 1	Absent	Absent	Present	Absent
Variety 2	Absent	Absent	Present	Present
Variety 3	Absent	Absent	Present	Absent
Variety 4	Absent	Absent	Present	Present
Variety 5	Absent	Absent	Present	Absent
Variety 6	Absent	Absent	Present	Absent

Table 3: The influence of treatments to attack pathogens tomatoes grown organically

No. trat.	Date of execution treatment	Product used	The role of treatment
1	30.05	Alcoholic plant extract	Control of greenhouse whitefly and aphids, prevention of fungal pathogen attack
2	21.06	Bordeaux juice	Control and prevention of fungal pathogen attack
3	1.07	Plant maceration	Prevention and control of fungal pathogen attack
4	12.07	Bordeaux juice	Prevention and control of fungal pathogen attack
5	25.07	Alcoholic plant extract	Control of greenhouse whitefly and aphids, prevention of fungal pathogen attack
6	4.08	Bordeaux juice	Control of greenhouse whitefly and aphids, prevention of fungal pathogen attack

Table 4 :Attack of Mycovelosiella fulva (GA%) in 20.06.2023

Nr.crt. No.	Varianta The variant	GA%	% of control	Difference to control	Significance
1,	Variety 1	1,23	88,49	-0,16	-
2,	Variety 2	0,90	64,75	-0,49	0
3,	Variety 3	1,01	72,66	-0,38	-
4	Variety 4	2,32	166,91	0,93	XX
5	Variety 5	0,84	60,43	-0,55	0
6	Variety 5	2,01	144,60	0,62	X
7	Variety average	1,39	100	Martor	Martor
DL 5 % = 0,45 DL 1% = 0,74 DL 0,1 % = 0,98					

Table 5: Attack of Mycovelosiella fulva (GA%) on 3.08.2023

No.	The variant	GA %	% of control	Difference to control	Significance
1.	Variety 1	0,44	137,5	-0,12	0
2.	Variety 2	0,10	31,25	-0,22	00
3.	Variety 3	0,29	90,62	-0,04	-
4.	Variety 4	0,54	168,75	0,22	XX
5.	Variety 5	0,09	28,12	-0,23	00
6.	Variety 5	0,50	156,52	0,18	XX
7.	Variety average	0,32	100		
DL 5 % = 0,10 DL 1% = 0,17 DL 0,1% = 0,24					

Calculations regarding the degree of attack of the fungus Mycovellosiella fulva(tab. 4 and tab.5) indicated values ranging between 0.84% for variety 5 and 2.32% for variety 4. For the other varieties, the values of the degree of attack were between 0.9% and 2.01%.The evolution of the fungus Mycovellosiella fulva was stopped following the application of the Bordeaux mixture treatment on 21.06.2023 and kept under control following the application of treatments 3, 4, 5 and 6. Thus, at the last assessment, which was made at the beginning of August, the values of the degree of attack were much reduced.

Conclusions

From the analysis of the data recorded during the years of study, it was found that the measures and methods used in organic tomato cultivation ensured the simultaneous prevention and control of the micromycetes Phytophthora infestans, Leveillula taurica, Micovelosiela fulva and Botrytis cinerea,

It can also be appreciated that the six new tomato creations studied are suitable for organic cultivation under controlled conditions, distinguishing themselves by their good behavior when attacked by harmful agents.

BIBLIOGRAPHY

1. Iacob V. (2006). Bolile plantelor cultivate, prevenire și combatere., Editura PIM“ Iași“, pag. 206.
2..Iacob V. (2010). Bolile plantelor cultivate, prevenire și combatere, Editura ALFA, Iași
3. Jones JB, Jones JP, Stall RE, Zitter TA (1991) Compendium of tomato disease. American Phytopathological Society Press, St. Paul, USA.
Marinescu Gh (1992). Bolile bacteriene ale plantelor legumicole și floricole, Editura Ceres, București.
4. Martínez-Valverde I, Periago MJ, Provan G, Chesson A (2002). Phenolic compounds, lycopene and antioxidant activity in commercial varieties of tomato (*Lycopersicum esculentum*). Journal of the Science of Food and Agriculture 82(3):323-330.
5. McGrath MT, Shishkoff N (1999). Evaluation of biocompatible products for managing cucurbit powdery mildew. Crop Protection 18(7):471-478.
6. Mechlouch RF, Elfalleh W, Ziadi M, Hannachi H, Chwikhi M, Ben Aoun A, Elakesh I, Cheour F (2012). Effect of different drying methods on the physico-chemical properties of tomato variety ‘Rio Grande’. International Journal of Food Engineering 8(2): article 4.
7. Mititiuc M (1993). Bolile plantelor legumicole, Editura Universității “Al.I. Cuza”, Iași.
8. Mitrea R (2006). Boli cheie ale principalelor specii horticole, Editura Universitaria, Craiova.
9. Mitrea R, Necula C (2004). Fitopatologie, Editura Universitaria, Craiova.
10. Mitrea R, Tudor - Radu M, Tudor - Radu CM, Tița I (2013). Phytosanitary condition of tomatos crop after application of ecological control schemes. Analele Universității din Craiova, seria Biologie, Horticultură, Tehnologia Prelucrării Produselor Agricole, Ingineria Mediului, XVII (LIV):651-657.