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LABORATORY EFFECT OF FUNGISTATIC ACTIVITY OF SOME PLANT EXTRACTS ON PHYTOPATHOGENIC FUNGI

Agnieszka Jamiołkowska[1], Weronika Kursa[1], Barbara Skwaryło-Bednarz[1], Radosław Kowalski[2], Jakub Wyrostek[2], Elżbieta Patkowska[1], Elżbieta Mielniczuk[1], Marek Kopacki [1]

[1]Department of Plant Protection, University of Life Sciences in Lublin, Leszczyńskiego St. 7, 20-069 Lublin, Poland

[2]Department of Analysis and Food Quality Assessment, University of Life Sciences in Lublin, Skromna St. 8, 20-704 Lublin, Poland

THE AIM of the research was the laboratory evaluation of fungistatic effect of alcohol extract of some herbal plants on the growth of selected phytopathogenic fungi strains.

Photo 1. Fungi cultures (on PDA) used in the *in vitro* experiment

MATERIALS AND METHODS

The research material consisted of above-ground part of horseradish (*Armoracia rusticana* L.), yarrow (*Achillea millefolium* L.) and tansy (*Tanacetum vulgare* L.) collected before flowering, from natural sites located in Lublin (Lublin Province, Poland). In the experiment, various concentrations of plant extracts (5%, 10%, 20%) were tested for the growth of ***Alternaria alternata*** (strain PCL10), ***Botrytis cinerea*** (strain CH10), ***Colletotrichum coccodes*** (strain P74/2) and ***Fusarium oxysporum*** (strain ECR4) (Photo 1).

RESULTS

Alcohol extracts from tansy and yarrow leaves had a higher concentration of flavonoids (respectively 22.3 mg/ml; 23.1 mg/ml), polyphenols (respectively 36.9 mg/ml; 37.4 mg/ml) and were characterized by higher antioxidant activity (respectively 59.4 mM; 63.1 mM) than the corresponding horseradish extract (respectively 1.2 mg/ml; 20.8 mg/ml; 3.1 mM).

The strongest fungistatic effect of alcohol extracts was recorded on the 4th day of the experiment against *Alternaria alternata* and *Botrytis cinerea* in the case of 20% tansy extract (Aa-39.1%, Bc-37.1%) and 20% yarrow extract (Aa-23.1%, Bc-59.6%) (Photo 2).

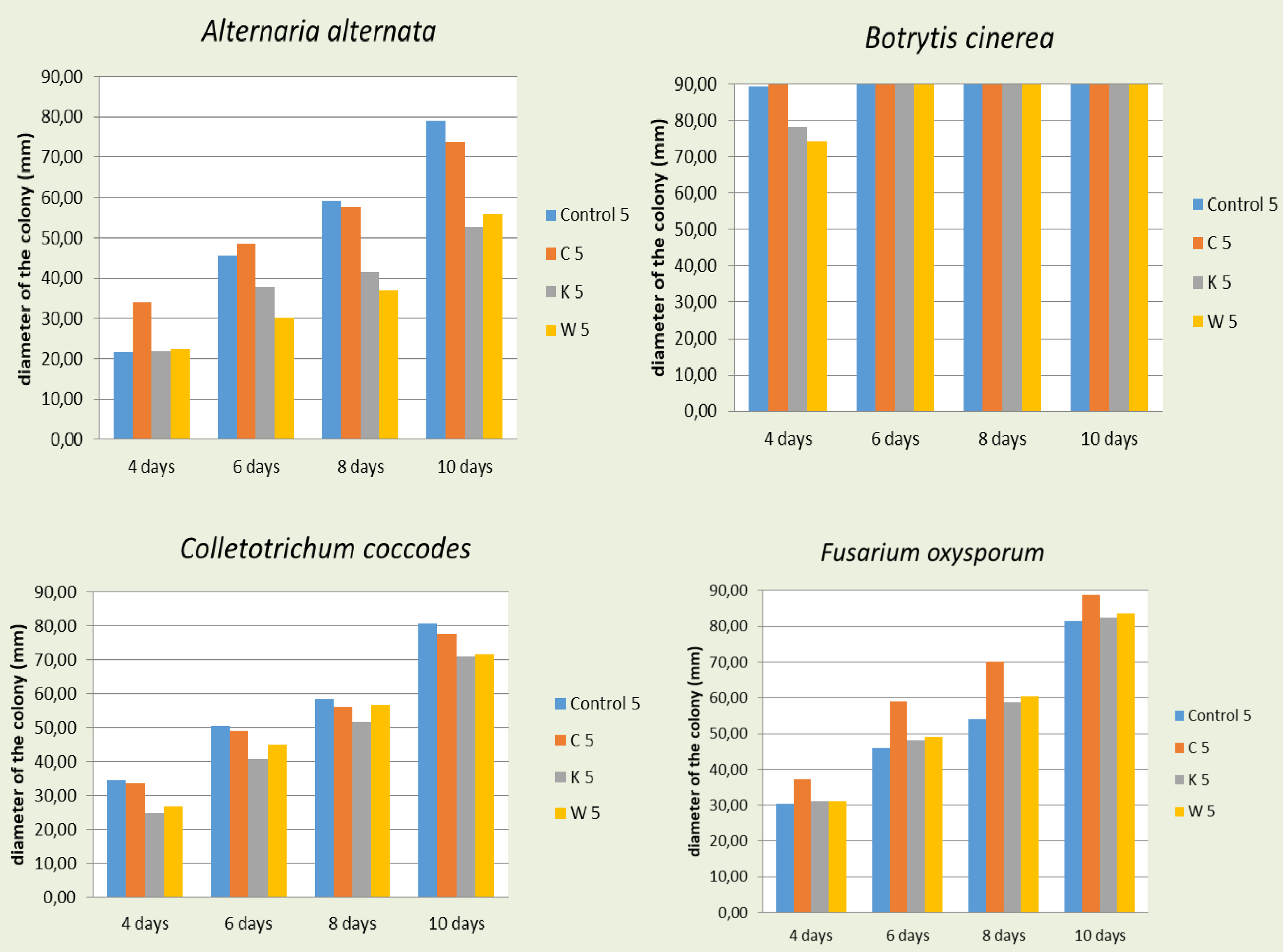

Photo 2. Effect of fungistatic activity of plant extracts from horseradish (C), yarrow (K), tansy (W) leaves and control in concentration 5% on phytopathogenic fungi strains

CONCLUSIONS

1. Plant extracts limited the growth of fungi to a varying degree, depending on the fungus species, the type of extract, its concentration and duration of activity.
2. The fungistatic activity of the extracts decreased with time.
3. The fungistatic activity of the herbal plant extracts depended on the content of biologically active compounds.
4. The strongest fungistatic effect were shown after application of tansy and yarrow leaf extracts
5. The weakest fungistatic effect was shown after application of horseradish leaf extract for all fungal strains.

Agnieszka Jamiołkowska, Weronika Kursa, Barbara Skwaryło-Bednarz
Department of Plant Protection, University of Life Sciences in Lublin, Poland
SUMMARY. Xenobiotic pollutants accumulate in the environment as a result of agriculture chemicalization. Uncontrolled leakage of contaminants into food poses a great threat to consumer health. Chemicals in agriculture are one of the significant ecological stresses also faced by plants, as they can block their enzymatic systems, contribute to p

- **ROLE OF MYCORRHIZAE IN SUSTAINABLE AGRICULTURE**

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- Department of Plant Protection, University of Life Sciences in Lublin, Poland

- **SUMMARY.** Xenobiotic pollutants accumulate in the environment as a result of agriculture chemicalization. Uncontrolled leakage of contaminants into food poses a great threat to consumer health. Chemicals in agriculture are one of the significant ecological stresses also faced by plants, as they can block their enzymatic systems, contribute to physiological changes, which is often associated with tissue and cell death. One of the strategies is to promote and implement sustainable or organic farming. Biological control (BC) has become one of the most widely applied alternatives to pesticides for pest and disease control in agriculture production. It reduces the risks posed by chemicals to the environment and human health and increasing development of resistance by plant pests to these chemicals (Elliott et al. 2009). BC has become one of the most widely applied alternatives to pesticides for pest and disease control in agriculture production. Antagonistic microorganisms and mycorrhizal fungi (MF) are of great importance among biological protection agents, and their application in sustainable and organic agriculture is becoming increasingly popular (Mahmood and Rizvi 2010). Mycorrhiza plays a significant role especially as a factor limiting biotic and abiotic plant stresses, thereby indirectly contributing to reducing the consumption of agrochemicals, e.g. pesticides (Wang et al. 2012, , Jamiołkowska et al. 2018). Mycorrhiza is an old and ubiquitous symbiosis formed between a relatively small group of soil fungi and higher plant roots and affects host plants in several aspects of their growth (physiology, phytopathology, biochemistry). MF have the potential to influence the economic benefits of agricultural systems through both direct and indirect processes related to plant nutrition (Smith and Smith 2012). MF provide plants with access to soil nutrients, protect against diseases and toxicities and play other roles such as soil aggregation, plant protection against drought stress and soil pathogens, as well as increasing plant diversity. MF interact with most crop plants, including cereals, vegetables and fruit trees, and are therefore receiving increasing attention due to their potential use in sustainable agriculture. Not only can MF improve soil and plant health, but it can also alter the accumulation of contaminants in plants. The benefits and mechanisms behind MF's role in ameliorating organic contaminant residues in crops can be summarized as follows: (1) increased biomass through improved mineral nutrition and water availability, (2) alleviation of oxidative stress induced by contaminants, (3) enhanced activity of contaminant degradation-related enzymes, (4) accumulation and sequestration of contaminants by AMF structures, (5) stimulation of contaminant-degrading microorganisms in soil, (6) improved soil structure, and (7) reduced pesticide application due to increased crop resistance to pathogens and improved competition with weeds. Finally, future challenges and perspectives regarding MF's contribution to crop safety are proposed (Wang et al. 2012).