

## Antifungal activity of *Achillaea millefolium* extract against pathogens of plant root rot

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### INTRODUCTION & AIM

Phytopathogens affect all types of agricultural plants in all regions of the world. The annual losses from these pathogens in the global economy amount to tens of billions of dollars. All over the world, great importance is attached to environmentally friendly means of protecting plants from pathogens, so a promising direction is the use of green technologies for the development of biological products based on plant extracts and their natural compounds. The purpose of the study was to evaluate the antifungal activity of *Achillaea millefolium* extract of the *Compósitae* family against pathogens that cause root rot of plants and to determine their component composition.

### METHOD

An aqueous-alcoholic extract of the plant *Achillaea millefolium* was obtained by grinding the leaves, washing with running water, then with sterile water, drying, grinding into powder, extraction with 70% ethanol, followed by settling and filtering. The antifungal activity of the extract was determined by the agar diffusion method. The fungicidal activity of the ethanol extract was also determined by adding it to the KGA medium (before pouring into Petri dishes) and after it solidified, the mycelium of the fungi was sown. The control was a medium with a fungus without adding the extract. *Fusarium oxysporum*, *F. solani*, *Penicillium notatum*, *Alternaria alternata*, *A. compacta* previously isolated from soybean plants affected by root rot, were used as test microorganisms. The component composition was determined using HPLC and gas chromatographic analysis.

### RESULTS & DISCUSSION

It was shown that the extract of *Achillea millefolium* has high antifungal activity (Figure 1, 2); the growth inhibition zones of *F. oxysporum*, *F. solani*, *A. alternata*, *A. compacta* and *P. notatum* were 36.3 mm, 39.6 mm, 37.3 mm, 30 mm and 31.0 mm, respectively (Table 1). The following were found in the component composition of the extract: derivatives of flavones, quercetin, kaempferol, phenolic acids, decanoic acid, etc.

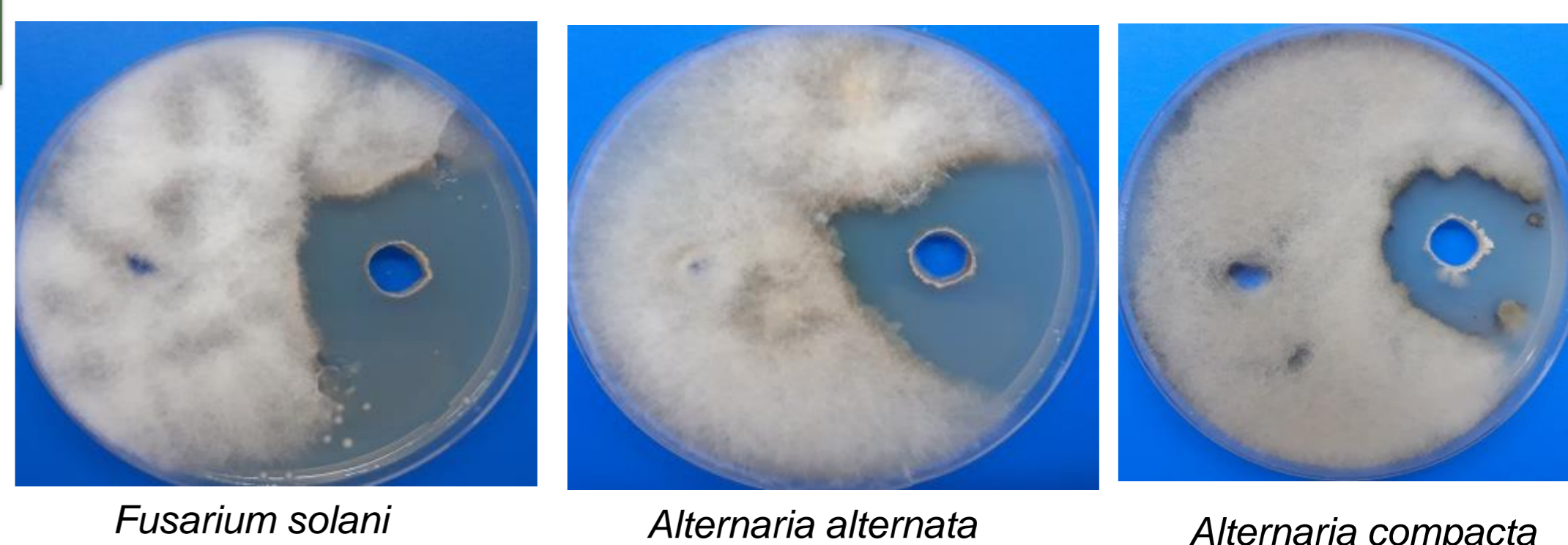


Figure 1. Zones of inhibition of phytopathogen growth by *Achillea millefolium* extract

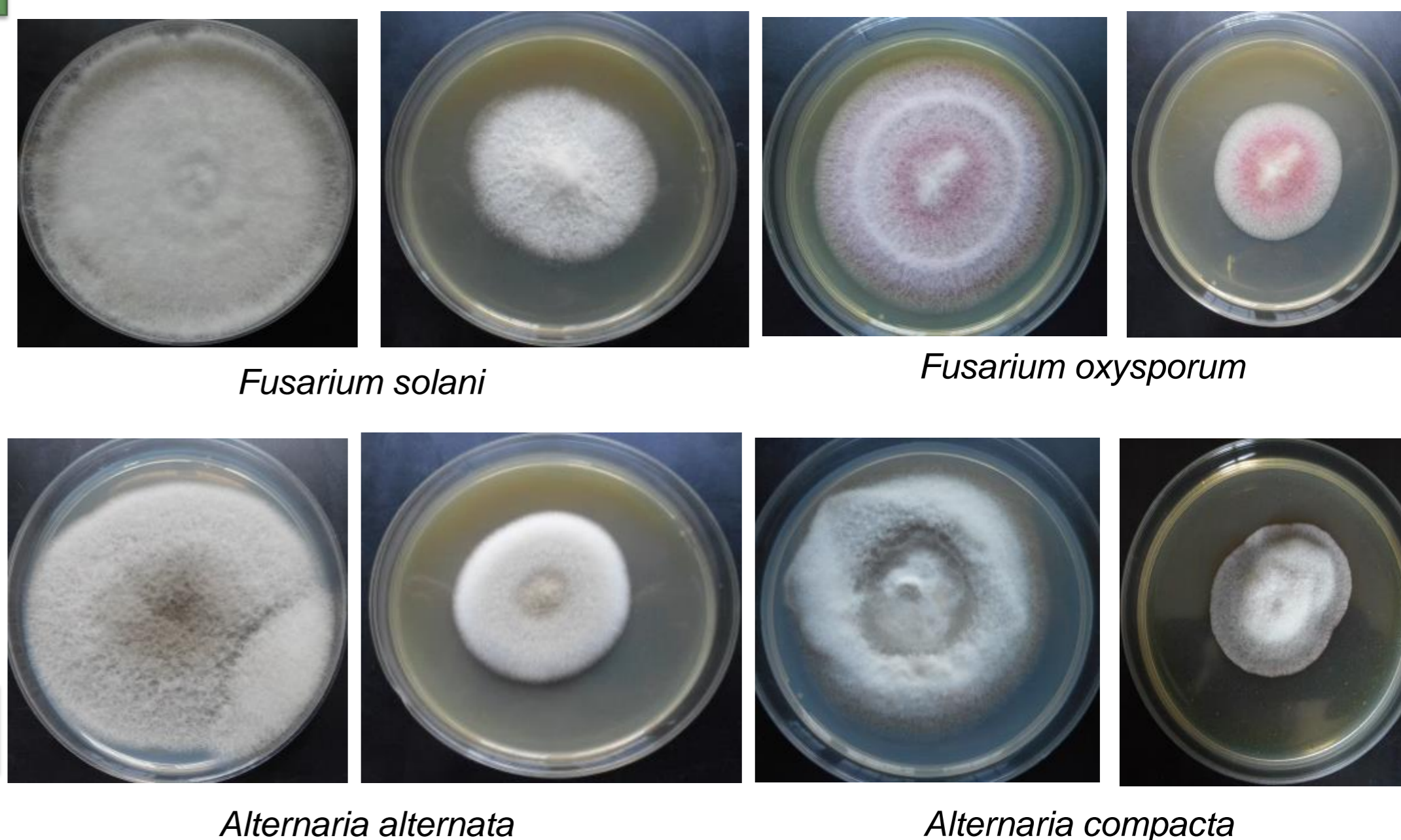


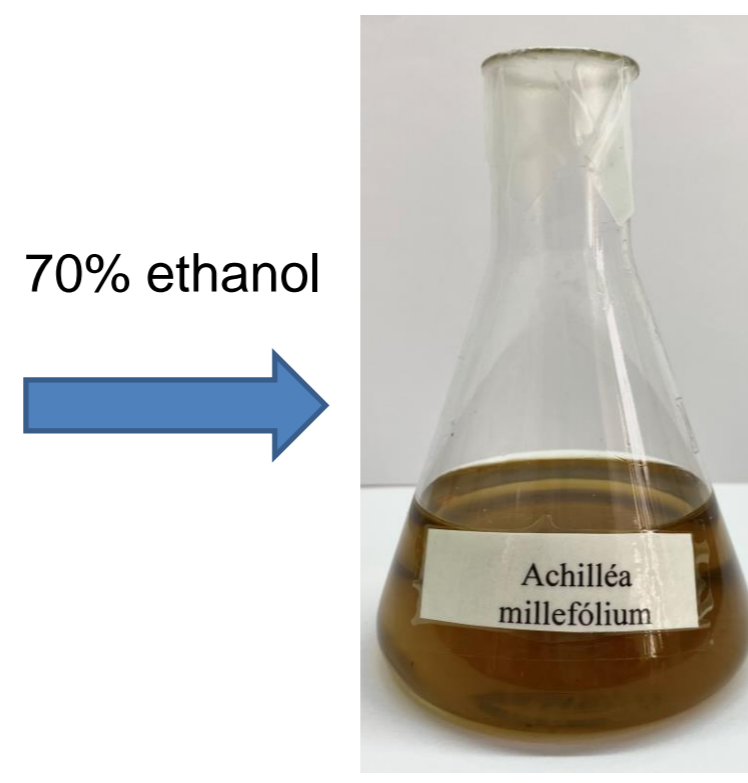
Figure 2. Pathogen growth on a medium with extract (left - control; right - test extract)

Table 1. Antifungal activity of ethanol extract of *Achillea millefolium*

Experimental variant	Phytopathogens				
	<i>F. oxysporum</i>	<i>F. solani</i>	<i>A. alternata</i>	<i>A. compacta</i>	<i>P. notatum</i>
Zones of inhibition of growth of phytopathogens, mm					
<b>A. millefolium extract</b>	36,3±2,0	39,6±0,57	37,3±0,7	30,0±0	31,0±1,15
<b>Control (70% ethanol)</b>	0	0	0	0	0



The plant *Achillaea millefolium*



*Achillaea millefolium* extract

### CONCLUSION

The *Achillaea millefolium* plant extract and the complex of its natural compounds can be further used as a basis for the development of environmentally friendly drugs against plant root rot pathogens.

### Conflict of Interest/ REFERENCES

The authors declare no conflicts of interest.