

Таким образом, использование примененных органических добавок приводит к увеличению процента прорастания семян, особенно у трудно прорастающих видов рода *Dactylorhiza*, и ускоряет рост протокормов в дальнейшем. По совокупности обоих показателей наиболее оптимальной является среда с повышенным содержанием картофельного отвара и добавлением глутамата натрия и ананасового сока.

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IMPACT OF FUNGAL BIOLOGICALLY ACTIVE SUBSTANCES ON PLANT GROWTH

Keywords: Fungal extracts, bioactivities, plant growth, pigments.

Inonotus obliquus, *Fomes fomentarius*, *Fomitopsis pinicola*, *Trichaptum pergamenum* are the xylotrophic fungi belongs to the higher basidiomycetes which synthesize bioactive substances including proteins, phenolics and flavonoids among others. Fungal secondary metabolites are the biologically active substances. Previous studies have found that these biochemicals could regulate many plant functions such as growth, and pest and stress resistances [1, 2].

Materials and methods. Dry biomass of *Inonotus obliquus*, *Fomes fomentarius*, *Fomitopsis pinicola* and *Trichaptum pergamenum* have been used to extract bioactives which have thereafter been tested as growth regulating factors in different cultivars. Seeds of barley, cucumber and tomato have been used to study the impact of bioactives extracted from above mentioned fungi species.

A series of extraction have been carried out from 500 mg of dry biomass of each fungi species using 10 ml 80 % ethanol, 4 ml 60 % ethanol, 4 ml 40 % ethanol and 5 ml hot diH₂O, consequently. After extraction and filtration, the extracts were dried using water bath. The obtained residues were re-dissolved into 30 ml diH₂O.

Seeds of every cultivar were grown on filter paper in Petri dishes moistened with each of the extracts; the control plants were grown using only distilled water. They have been assessed on daily basis.

80% acetone extracts of leaves were used for the determination of chlorophylls a & b, and carotenoids using spectrophotometer (Apel UV–VIS, Japan) at 663 nm, 647 nm and 470 nm respectively [3].

Results and discussion. There was no significant difference in seed germination between control and treated plants in each species. Nevertheless, the best results were shown for the cucumber and tomato plants treated by *T. pergamenum* extract (Fig. 1). In barley the most visible effect was shown for *F. pinicola* extract. The rest extracts slightly reduce seed germination. The concentration of photosynthetic pigments was also higher in treated by fungi extracts plants (Table 1). The increase was about 1.3–1.6 times for chlorophylls and 1.2–3.0 for carotenoids. *I. obliquus* did not change the content of carotenoids, but other extracts had a positive influence on their concentration.

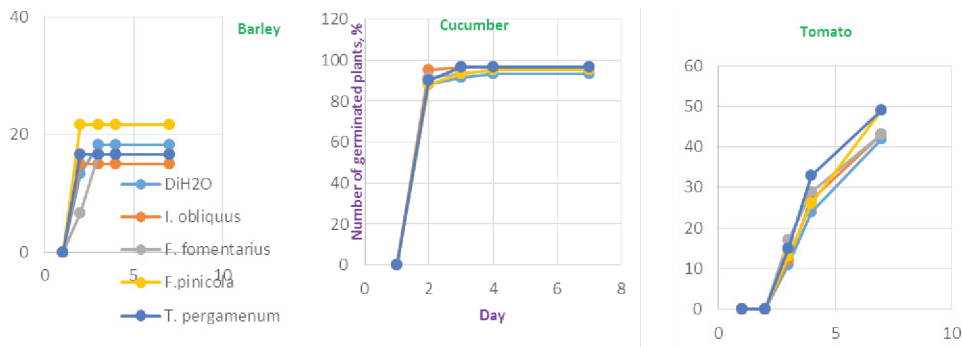


Fig. 1. The number of germinated plants

Table 1.

The chlorophyll a, b and carotenoid content mg/g fresh weight

Crop	Barley			Cucumber			Tomato		
	Chl a	Chl b	Car	Chl a	Chl b	Car	Chl a	Chl b	Car
DiH ₂ O	0.68 ± 0.12	0.33 ± 0.08	0.13 ± 0.04	0.31 ± 0.09	0.18 ± 0.03	0.07 ± 0.01	0.74 ± 0.064	0.27 ± 0.02	0.14 ± 0.014
<i>I. obliquus</i>	0.78 ± 0.08	0.37 ± 0.09	0.11 ± 0.01	0.37 ± 0.03	0.22 ± 0.02	0.07 ± 0.02	0.75 ± 0.06	0.42 ± 0.11	0.13 ± 0.007
<i>F. fomentarius</i>	1.01 ± 0.26	0.44 ± 0.08	0.16 ± 0.06	0.41 ± 0.03	0.22 ± 0.01	0.09 ± 0.01	0.71 ± 0.024	0.31 ± 0.009	0.13 ± 0.005
<i>F. pergamenum</i>	0.90 ± 0.17	0.30 ± 0.06	0.16 ± 0.02	0.40 ± 0.03	0.22 ± 0.02	0.08 ± 0.01	0.72 ± 0.077	0.31 ± 0.029	0.13 ± 0.015
<i>T. pinicola</i>	0.76 ± 0.08	0.27 ± 0.04	0.14 ± 0.02	0.41 ± 0.02	0.26 ± 0.02	0.08 ± 0.02	0.82 ± 0.013	0.35 ± 0.006	0.15 ± 0.003

Biomass accumulation in barley was the highest in the case of *T. pergamenum* extract, whereas in other cases and species no any regular results were obtained (Fig. 2).

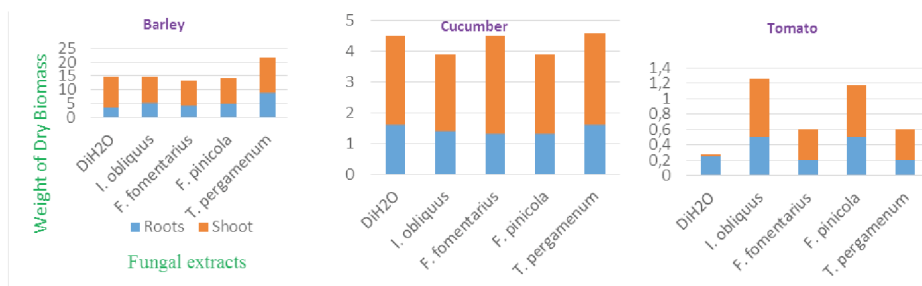


Fig. 2. Root and shoot dry biomass of barley, cucumber and tomato plants

Conclusion. The results show that the biologically active substances present in fungal extracts, and in general they have some impact on seed germination, pigments formation, root and shoot biomass in barley, cucumber and tomato seedlings.

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