



**SEVENTH INTERNATIONAL CONFERENCE
SUSTAINABLE POSTHARVEST AND
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ANTIFUNGAL POTENTIAL OF GARLIC ESSENTIAL OIL ON *ASPERGILLUS* SPECIES ISOLATED FROM FOOD

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Aspergillus species are common contaminants of medium and low moisture foods. By their metabolic activity, they cause food spoilage, leading to great economic damage. However, much higher problem are toxigenic species, which under certain conditions can synthesize and excrete mycotoxins, extremely toxic compounds, in food. It is well known that species *A. flavus* and *A. parasiticus* can produce aflatoxins, *A. carbonarius*, *A. ochraceus* and *A. niger* (some isolates) can synthesize ochratoxin A (OTA), while *A. versicolor* can produce sterigmatocystin (STC). Alimentary intake of these toxic compounds in humans and animals organism could causes diseases called mycotoxicosis. Mycotoxicosis are manifested by various harmful effects on human and animal cells, such as cytotoxicity, hepatotoxicity, teratogenicity, mutagenicity, carcinogenicity, etc. To prevent the side effects that different molds species can have as food contaminants, it is important to know the molds species, their properties, as well as the influence of different factors that can stimulate or inhibit their growth. On the other hand, increasing demand for food that is minimally technologically processed and without synthetic additives, have led to an increase of interest and use of natural additives, such as plant extracts and essential oils.

In this work, the antifungal activity of garlic essential oil on *Aspergillus* species, was examined. The essential oil was obtained by water vapour distillation of chopped fresh garlic, *Allium sativum* L. cv. Bosut, while *Aspergillus* species (*A. niger*, *A. carbonarius*, *A. wentii*) were isolated from food. Agar plate method was used to determine the antifungal activity of essential oil. The rate and inhibition of mold growth as well as the minimum inhibitory (MIC) or minimum fungicidal concentrations (MFC) were analyzed. The applied concentrations (3.5; 7.0; 14.0 and 28.0 µL/100 mL) of garlic essential oil, caused the delay or absence of molds growth with different inhibitory effects on deceleration in the growth rate. The fungicidal concentration for *A. carbonarius* and *A. wentii* was 28.0 µL/100 mL, while this concentration showed an inhibitory effect on *A. niger* and delayed the growth of this mold for 11 days. In general, the tested garlic essential oil showed the optimal antifungal effect against *A. wentii*, and the lowest activity against *A. niger*. The results of this study indicate that the garlic essential oil has potential to be use as a natural antifungal agent in food.

Key words: Garlic essential oil, *Aspergillus* spp., food, antifungal activity

ANTIFUNGALNI POTENCIJAL ETARSKOG ULJA BELOG LUKA PREMA *ASPERGILLUS* VRSTAMA IZOLOVANIM IZ HRANE

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Aspergillus vrste su česti kontaminanti srednje i niskovlažne hrane. Svojom metaboličkom aktivnošću uzrokuju kvarenje hrane, a samim tim i velike ekonomske štete. Međutim, veliki problem predstavljaju toksigene vrste, koje pod određenim uslovima mogu sintetisati i izlučiti u hranu izuzetno toksična jedinjenja – mikotoksine. Tako, vrste *A. flavus* i *A. parasiticus* su poznate po produkciji aflatoksina, *A. carbonarius*, *A. ochraceus* i *A. niger* (neki izolati) po sintezi ohratoksina A (OTA), a *A. versicolor* sintetisuje sterigmatocistin (STC). Alimentarnim unošenjem ovih toksičnih jedinjenja u organizam ljudi i životinja nastaju oboljenja - mikotoksikoze. Mikotoksikoze se manifestuju različitim štetnim efektima na humane i animalne ćelije, kao što su citotoksičnost, hepatotoksičnost, teratogenost, mutagenost, kancerogenost, i dr. Poznavanjem vrsta plesni, njihovih svojstava, kao i odnosa prema faktorima koji mogu stimulisati ili inhibirati njihov rast, bitno je za sprečavanje neželjenih efekata koje one mogu imati kao kontaminanti hrane. S druge strane, povećanje potrebe za hranom koja je minimalno tehnološki procesirana i bez sintetičkih konzervansa i aditiva doveli su do povećanog interesa za prirodne biokonzervanse, kao što su ekstrakti i etarska ulja biljaka.

S toga, je u radu ispitana antifungalna aktivnost etarskog ulja belog luka prema *Aspergillus* vrstama. Etarsko ulje je dobijeno destilacijom vodenom parom usitnjenog svežeg belog luka *Allium sativum* L. kultivar Bosut. Ispitivane su *Aspergillus* vrste (*A. niger*, *A. carbonarius*, *A. wentii*) koje su izolovane iz hrane. Antifungalna ispitivanja su izvedena metodom agar ploča. Određivana je brzina i inhibicija rasta plesni, kao i minimalne inhibitorne (MIC) ili minimalne fungicidne koncentracije (MFC). Primenjene koncentracije (3,5; 7,0; 14,0 i 28,0 µL/100 mL) etarskog ulja belog luka su uticale na odlaganje ili odsustvo rasta ispitivanih plesni sa različitim inhibitornim efektima na brzinu rasta. Fungicidna koncentracija za *A. carbonarius* i *A. wentii* bila je 28,0 µL/100 mL. Ova koncentracija pokazala je inhibitorno dejstvo na *A. niger* i odložila početak rasta ove plesni za 11 dana. Generalno, ispitivano etarsko ulje belog luka pokazalo je najbolji antifungalni efekat prema *A. wentii*, a najslabiji prema *A. niger*.

Rezultati istraživanja ukazuju da ispitivano etarsko ulje belog luka poseduje antifungalni potencijal, što ga preporučuje kao prirodni biokonzervans u hrani.

Ključne reči: Etarsko ulje belog luka, *Aspergillus* spp., hrana, antifungalna aktivnost