Microbiological and ecological testing of *Ambrosia artemisiifolia*'s endophyta

Mária Fehér

Supervisors:

László Körmöczi
and
László Manczinger

**Faculty of Science and Informatics,
University of Szeged**

Department of Ecology

Hungary

The enemy…

Timeliness of the theme

- Ambrosia artemisiifolia (Common ragweed) causes global problem → health and ecosystem (*Mihály és Botta-Dukát — 2004*)
- **Invasive**, highly **allergenic**
- **Symbiosis** with mycorrhizae – helps with invasion (*Fumanal et. al. — 2006*) – What about endophytic fungi?

The tested plant

- **Common ragweed** (*Ambrosia artemisiifolia*) - From United States of America to Europe in the 1800's
- Generative reproduction
- **Seeds**: primer and secunder dormancy - breaks at low temperatures (in laboratory: 12 weeks, 4 °C)
- **Live with endophytes** – Preliminary research

History of Research – part 1

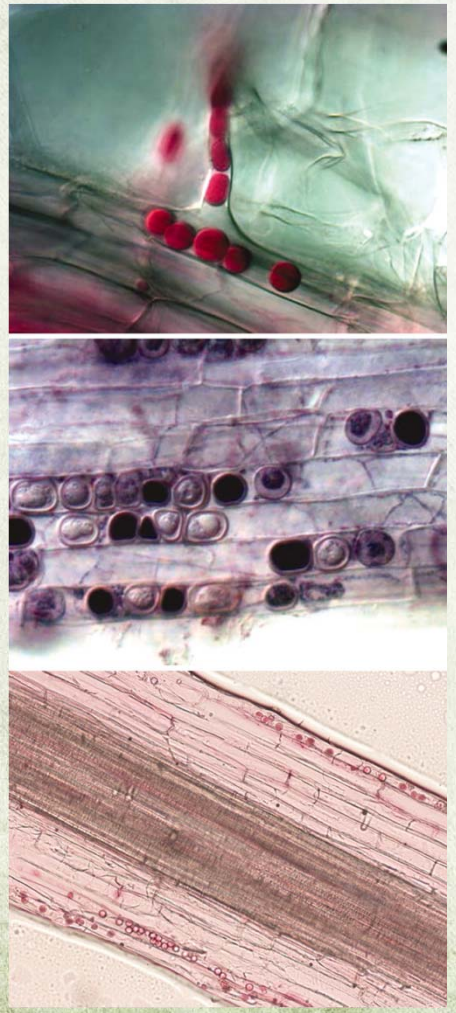
About mycorrhizal fungi

- Plants live with arbuscular mycorrhizal fungi in symbioses
- Phylum ***Glomeromycota***
- Obligate biotroph
- **Increased uptake** of nutrients such as phosporus and nitrogen. (*Juan et. al. — 2006*)

History of Research – part 2

About Endophytic fungi

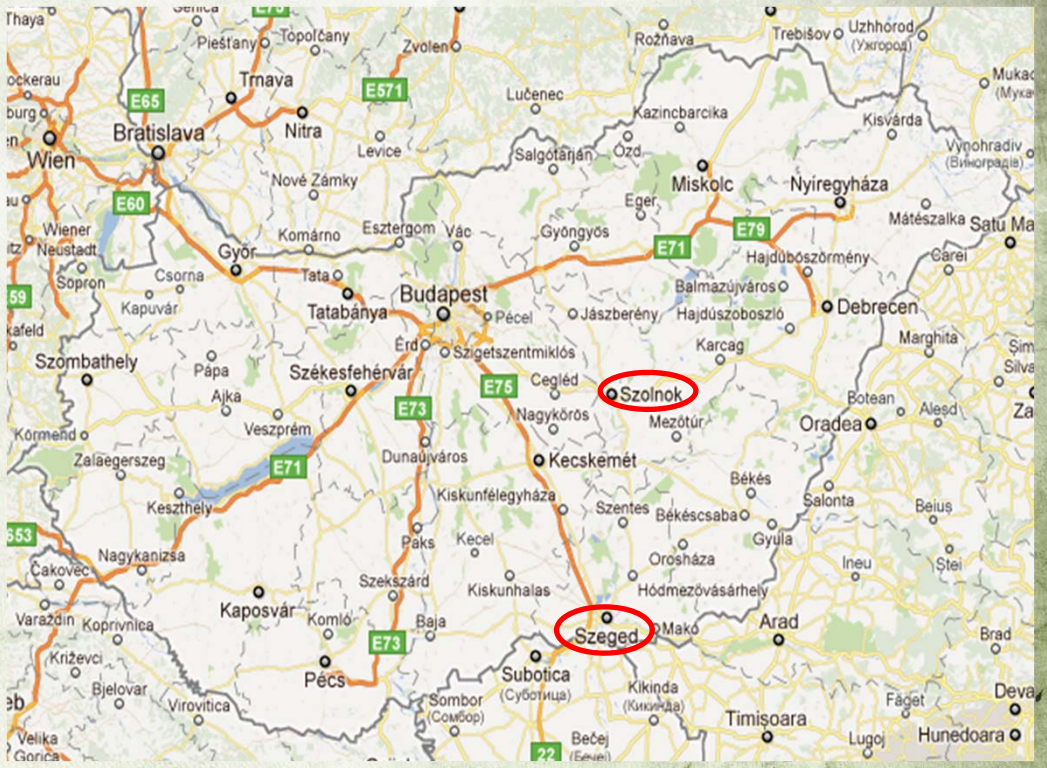
- Mycorrhizae **are not free-living**, but endophytes do
- Plants **protect and feed** them
- Endophytic fungi don't causes negative symptoms in plants (*Suryanarayan et. al. — 2009*)
- **Between the cells -** in the leaf



- **Never inside the cells**
- **Hydrolytic enzymes:** polymers -> monomers (*Huaijun et. al. — 2004*)
- **Protect** plants from insects and herbivorous -> **secrete toxic alkaloids** *(Breen 1994, Bush, Wilkinson & Schardl 1997).*

First period of the research

- **Sample collection:**
  - Bank of River Maros near Szeged
    - natural habitat
  - Szolnok
    - urban habitat

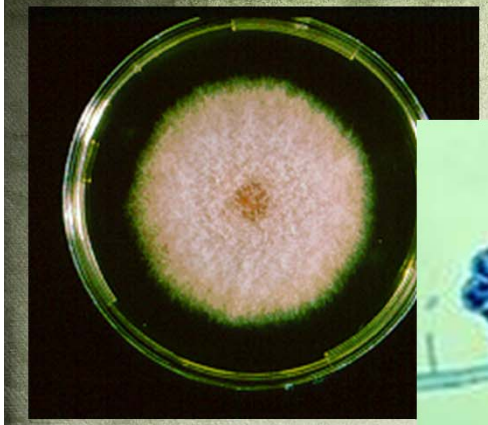


http://maps.google.com

Fungi isolated during the first experiment

- ***Fusarium chlamydosporum***
- ***Fusarium oxysporum (Fusarium oxysporum* var *redolens)***
- ***Fusarium solani***
- ***Fusarium redolens***
- ***Leptosphaerulina chartarum***
- ***Absidia repens***
- ***Mucor circinelloides***

Fusarium chlamydosporum



http://www.mold.ph

http://www.mold.ph/fusarium.htm

http://www.doctorfungus.org

Absidia sp.

http://www.caltexmoldservices.com

http://www.pf.chiba-u.ac.jp

Leptosphaerulina chartarum

http://www.doctorfungus.org

Fusarium oxysporum var *redolens*

http://www2.mst.dk

Fusarium solani

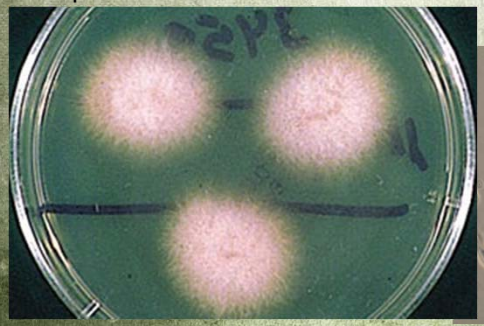
http://genome.jgi-psf.org

Mucor circinelloides

http://www.livne.co.il

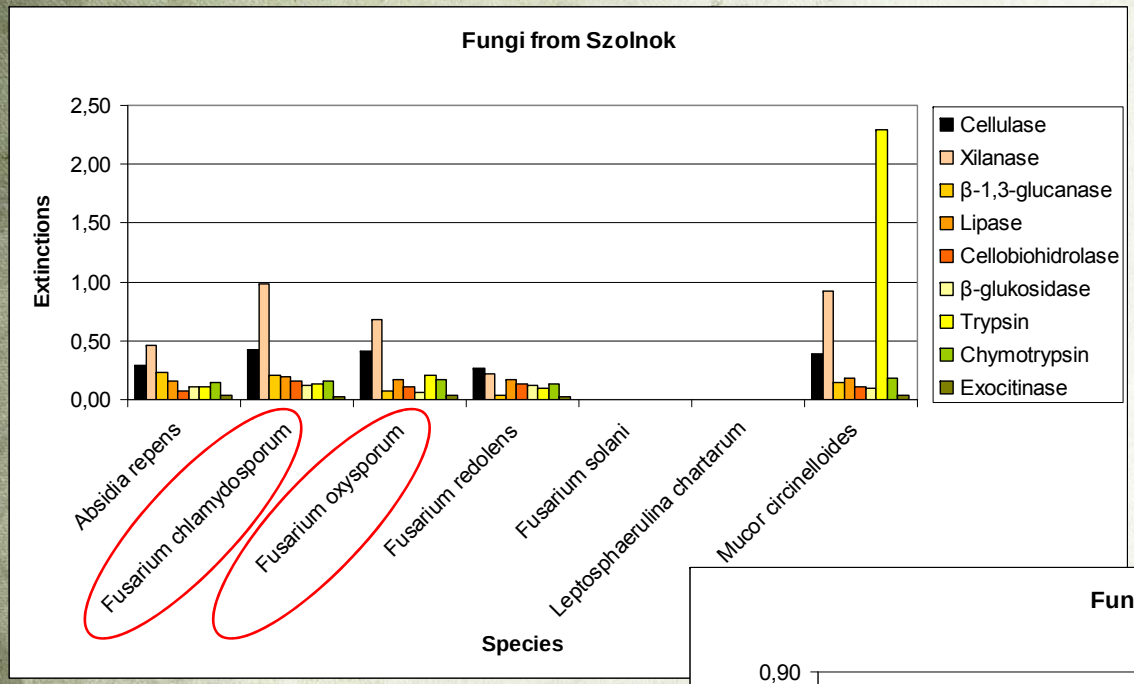
Fusarium oxysporum

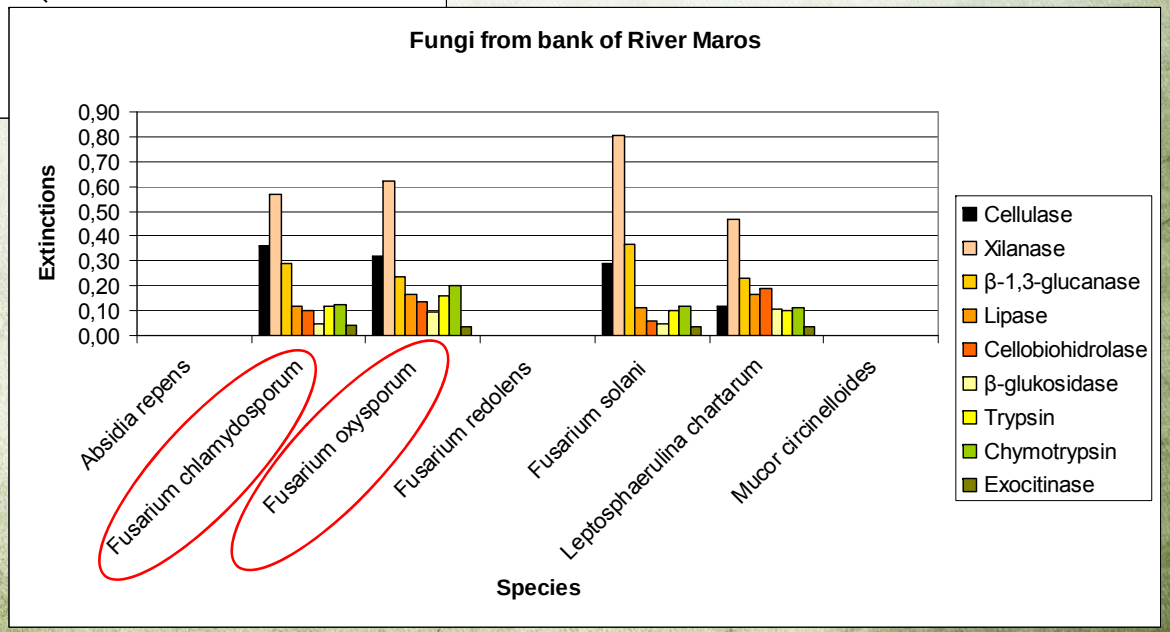
http://www.reviberoammicol.com



http://www.doctorfungus.org

Relative enzyme activity





Outlook

- The role of endophytic fungi in the adaptability of ragweed
  - Enzyme productions
  - Competition tests
  - Species level identification
- Test 4 different soils

on the arable field ,

abandoned fields

and grasslands

Sampling methods

- **Areas**:
  - Arable fields
  - Abandoned fields
  - Grasslands
- Whole root samples (5-5 from each area) – microbiological tests
- Soil samples – organic carbon, P, Ca, K, Na, pH,

Questions

- What kind of endophytic fungi live in the root of common ragweed?
- Which enzymes are produced by endophytic fungi?
- What kind of fungi can be isolated from plants living in different habitats such as arable field, abandoned fields and grasslands?
- What is the quantitative distribution of fungi in different habitats?
- How many fungi live in the roots of the plants living in different habitats?
- Which nutrients are better for endophytic fungal?
- Which fungal are necessary for Ambrosia and which fungal are better for Ambrosia?

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Thank you for your attention

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www.ujszechenyiterv.gov.hu
06 40 638 638

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