

**TN02000044/1 – V11**

# **VYUŽITÍ ROSTLINNÝCH A ŽIVOČIŠNÝCH ODPADŮ PRO FORMULACI MÉDIA PRO KULTIVACI ENDOFYTNÍCH BAKTERIÍ**

**(VÝSTUP TYPU O)**

**Ústní příspěvek na 12. mezinárodní ICCT konferenci, konané 14.-16. dubna 2025 v Mikulově**

**Odkaz na Book of Abstracts**

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**Abstrakt příspěvku**

**The use of plant and animal wastes for the preparation of media for the endophytic bacteria cultivation**

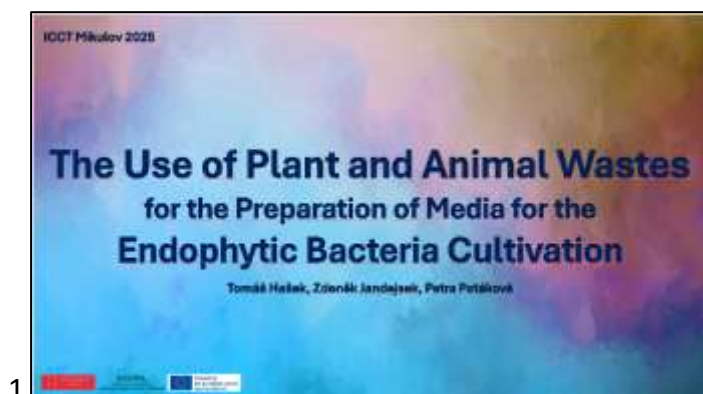
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The agricultural and food industries generate large quantities of plant and animal waste among their products, which are mostly useless or even unusable for further processing, although these materials are usually full of carbon and nitrogen sources that can still be used by other organisms, such as endophytic microorganisms, bacteria and fungi, which utilise them as an essential source of energy and elements for their metabolism, leading, among other things, to the production of secondary metabolites that could be used in other areas of industry for their myriad properties. The use of waste for the production of new products is also an example of circular economy, which can lead to an increase in a company's profits or at least a reduction in the cost of environmental disposal. Plant wastes such as brewer's spent grain, animal wastes such as carp residues from fish processing, leftovers from mechanically separated chicken meat, chicken feathers and spent brewer's yeast have been used to prepare media for the cultivation of endophytic bacteria, in particular *Pantoea agglomerans* DBM 3797, which have shown the potential to become a possible bioactive agent in the future to promote plant growth or even protect the plants from phytopathogens.

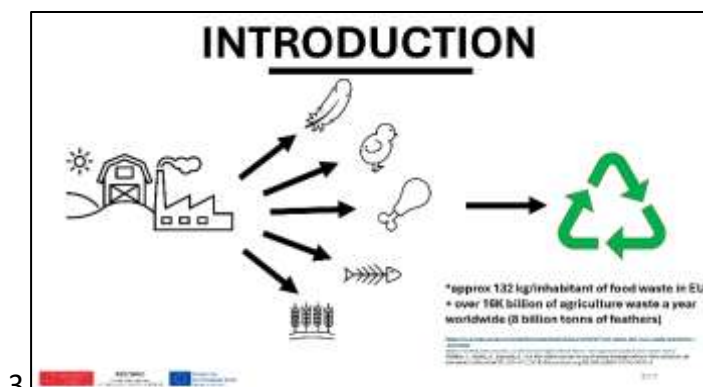
*This work was supported from the grant of TACR NPO TN01000044/1.*



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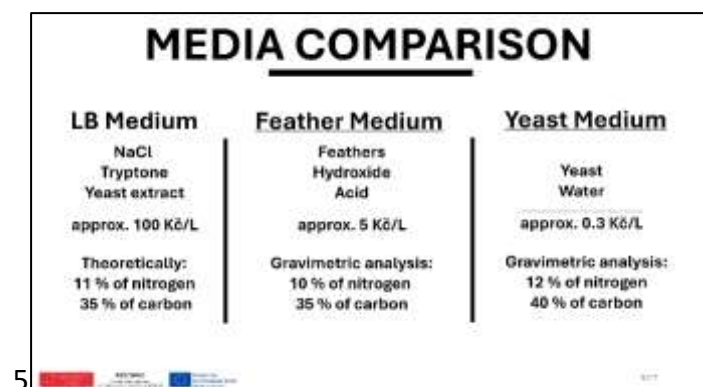
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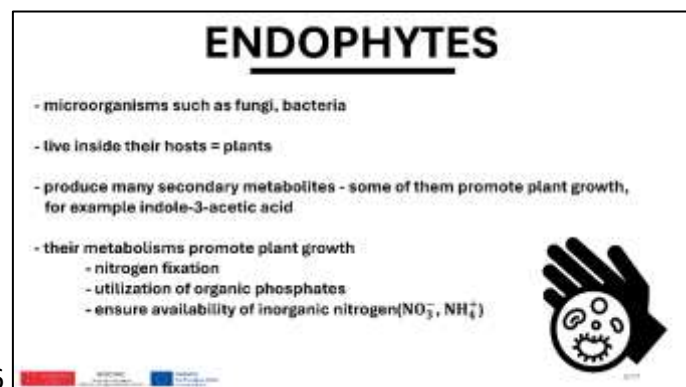
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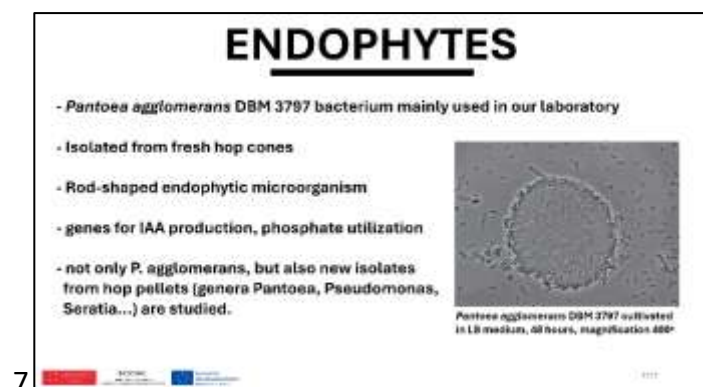
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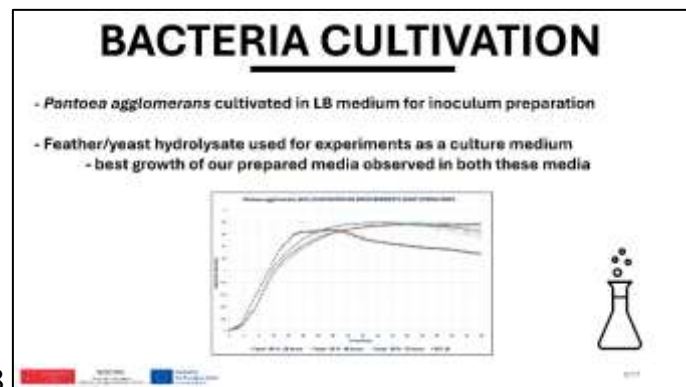
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## AMMONIUM ION RELEASE

- *Pantoea agglomerans* cultivated in many types of prepared hydrolysates
- 48 hours of cultivation in a tempered shaker, 30 °C, 150 RPM

|          | Straw-Hydrolysate<br>(acid hydrolysate) | Straw-Hydrolysate<br>(alkaline hydrolysate) | Straw-Hydrolysate<br>(enzymatic hydrolysate) | Straw-Hydrolysate<br>(enzymatic hydrolysate) | Straw-Hydrolysate<br>(enzymatic hydrolysate) | Straw-Hydrolysate<br>(enzymatic hydrolysate) |
|----------|-----------------------------------------|---------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| N (mg/L) | 707.160<br>± 14.945                     | 262.763<br>± 18.909                         | 773.916<br>± 18.436                          | 602.113<br>± 5.173                           | 828.637<br>± 44.000                          | 843.492<br>± 1.473                           |
|          |                                         |                                             |                                              |                                              | 823.626<br>± 35.179                          |                                              |

## APPLICATION IN AGRICULTURE

- The medium in combination with bacteria has the potential to become part of a biological agent used in agriculture
- to promote plant growth
- to protect plants from other microorganisms.



## PLANT GROWTH PROMOTION

- *Pantoea agglomerans* cultivated in Feather Medium for 48 hours, 30 °C, 150 RPM
- Feather hydrolysate after cultivation with *P. agglomerans* diluted in water (1:20)
- watering on the 1st and 4th day - one week in a greenhouse tent with simulated day/night light
  - Control seedlings - water
  - KK1 seedlings - Feather medium with *Pantoea agglomerans*
  - MS seedlings - Mourashige-Skoog medium



## PLANT GROWTH PROMOTION

| Control            | Feather Medium     | MS medium          |
|--------------------|--------------------|--------------------|
| <b>BIOMASS</b>     | <b>BIOMASS</b>     | <b>BIOMASS</b>     |
| Fresh: 100 %       | Fresh: +118%       | Fresh: +127%       |
| Dried: 100%        | Dried: +109%       | Dried: +117%       |
| <b>ROOT LENGTH</b> | <b>ROOT LENGTH</b> | <b>ROOT LENGTH</b> |
| 100%               | +146%              | +96%               |
| <b>LEAVES</b>      | <b>LEAVES</b>      | <b>LEAVES</b>      |
| 13 ± 0.8           | +14.5 ± 0.5        | +15.3 ± 0.5        |

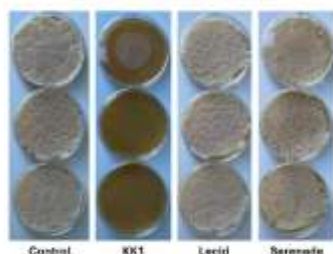
## PLANT GROWTH PROMOTION



## ANTIFUNGAL ACTIVITY

- *Pantoea agglomerans* cultivated in Feather Medium for 48 hours, 30 °C, 150 RPM
- The inoculum (1% V/V) was added to a 100 mL Erlenmeyer flask with 50 mL of YPD medium together with spores of *Verticillium dahliae* DSM 63083 (OD 0.1, 1% V/V)
- Cultivation 4 days, 24 °C, 150 RPM
- Control - YPD medium - *V. dahliae* 1% V/V
- KK1 - YPD medium - *V. dahliae* 1% V/V + *P. agglomerans* DBM 3787 1% V/V
- Lecid - YPD medium - *V. dahliae* 1% V/V + fungicide Lecid 1% V/V
- Serenade - YPD medium - *V. dahliae* 1% V/V + fungicide Serenade 1% V/V

## ANTIFUNGAL ACTIVITY



Control KK1 Lecid Serenade

## SUMMARY

- Feather hydrolysate is a great culture medium for endophytic microorganisms such as *Pantoea agglomerans*
- The combination of bacteria with feather hydrolysate has led to the promotion of plant growth of lettuce
- *Pantoea agglomerans* has antifungal activity against *Verticillium dahliae*

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