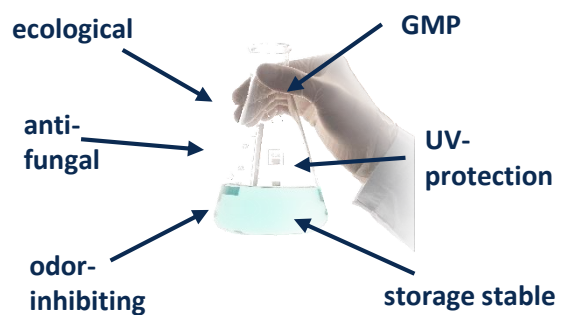


Biotechnological production of phytoextract from cell culture

MOTIVATION:

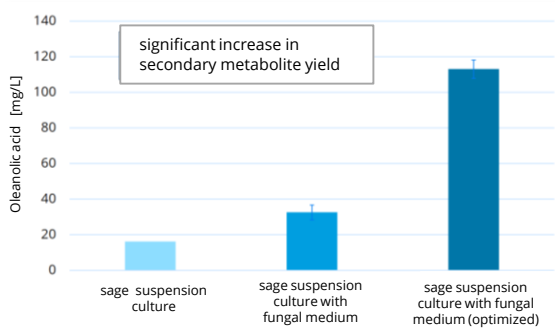
Plants exhibit natural protective mechanisms against external influences such as fungal or bacterial attack. This is attributable to substances produced in the plant cells. To make this active substances usable for humans, it is necessary to extract the substances from the cells. The phytoextract obtained in this way shows many positive properties and a wide range of applications. The plant cells can be obtained by cultivation in a bioreactor as an alternative to agricultural cultivation. Cultivation under controlled conditions enables targeted production, which is associated with a considerable increase in yield compared to land cultivation.



Beneficial properties of phytoextract from cell cultures of sage plant

THIS IS SPECIAL:

By adding a fungal medium to the cultured cells, a 70% increase in yield can be achieved.

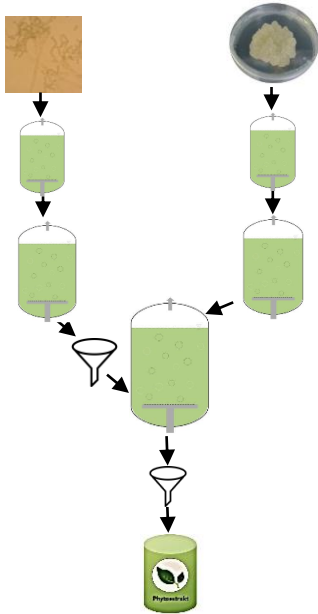


Yield of sage-callus culture
Kümritz, S., Louis, M., Haas, C. *et al.* "Fungal elicitors combined with a sucrose feed significantly enhance triterpene production of a *Salvia fruticosa* cell suspension". *Appl Microbiol Biotechnol* 100, 7071–7082 (2016).

POTENTIAL USES:

- Food additives
- Biopesticides
- Phytopharmaceuticals
- Natural pigments
- Wood preservatives





Flowchart for the processing of phytoextract from sage cells

BIOTECHNOLOGICAL CULTIVATION OF PLANT-DERIVED ACTIVE INGREDIENTS FROM SAGE:

As a preparatory process step, a tissue dressing (callus culture) is obtained from the sage plant. Subsequently, the callus culture is multiplied stepwise in bioreactors. Under defined process and environmental conditions, the required cells are multiplied without having to grow the entire plant, which would require a lot of agricultural land. In a parallel process, a fungus is also cultivated *in-vitro* under defined conditions and then processed by triple filtration. The finished fungal-culture-filtrate is added to the cells in the final cultivation step to increase the yield of the cell extract (phytoextract). After cultivation, the phyto-extract is processed. This involves cell disruption and separation of the active ingredient from the other components by centrifugation and filtration.



ADVANTAGES OF BIOTECHNOLOGICAL PRODUCTION:

Instead of agricultural cultivation, the sage cells are cultivated in the bioreactor. This results in several advantages:



- **Sustainability**

- no additional acreage required
- renewable raw material
- no competition with food, feed and energy crops



- **constante quality und quantity**

- Independent of environmental factors (e.g. climate, light, pests...)

- **Defined production parameters**

- controlled system



- **Good Manufacturing Practice**

- suitable for pharmacy, cosmetics

- **Big yield**



The developed manufacturing process produces a natural product with consistently high quality. This allows to reduce the use of chemical and environmentally harmful substances.