101 - Development of a novel fermentation process for an endophytic *Beauveria bassiana* strain

Entwicklung eines neuartigen Fermentationsverfahrens für ein endophytisches Beauveria bassiana Isolat

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A novel biological plant protection strategy could be the use of the endophytic entomopathogenic fungus *Beauveria bassiana* isolate ATP-02. To use this endophyte as a commercial biocontrol agent, it has to be mass-produced.
B. bassiana was raised in shake flask cultures to produce submerged conidiospores (SCS) which are reported to show a higher shelf life than mycelium and blastospores. In total, 23 technical culture media based on different carbon sources, minerals and technical yeast extracts were screened. Furthermore in mineral media with 5% sugar beet molasses *B. bassiana* produced 0.1 x 10 SCS/g sucrose until 170 h after inoculation (Lohse et al. 2014). By adding 50 g/L NaCl 48 h after inoculation the SCS yield was increased to 1.4 x 10 SCS/g sucrose. The scale-up to a 2 L stirred tank reactor was carried out in mineral media with 5% molasses at 25°C, 200-600 rpm and 1 vvm at pH 5.5. At the beginning of the fermentation the amount of dry biomass increased because the fungus produced mycelium. After 72 h the biomass dry weight decreased due to a critical pO_2 of 4 % which was accompanied by a visible reduction of mycelium. At this time the spore yield started to increase up to 7.6 x 10 spores/g sucrose at the end of the fermentation. However, the biomass consisted of more than 95 % blastospores (Figure 1a). A shift from blastospores to SCS was induced by the addition of NaCl which resulted in an increase of SCS yield to 2.4 x 10 SCS/g sucrose (Figure 1b).

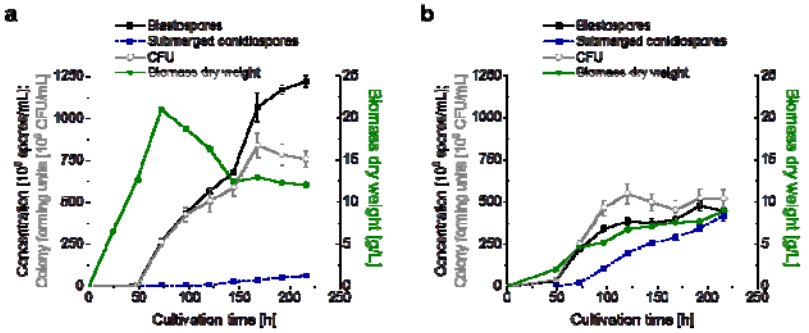

Fig. 1 Cultivation of *B. bassiana* in a 2 L stirred tank reactor. The figures show the mean (±SD) concentrations of blastospores and submerged conidiospores as well as the correlation of spore counts with biomass and mean (±SD) colony forming units. In each case, standard deviations resulted from two technical replicates. (**a**) Without osmotic stress. (**b**) With 50 g/L NaCl after 48 h.

To conclude, the endophytic *B. bassiana* isolate ATP-02 was cultivated to very high spore yields respectively to very high SCS yields without pelleting of the biomass. As other *B. bassiana* isolates can produce several metabolites like oxalate, oosporein and beauvericin, we want to examine whether *B. bassiana* ATP-02 is able to produce industrially relevant metabolites by investigation into the endophyte-plant interaction.

References

LOHSE, R., D. JAKOBS-SCHÖNWANDT, A. V. PATEL, 2014: Screening of liquid media and fermentation of an endophytic *Beauveria bassiana* strain in a bioreactor. AMB Express **4** (47), 1-11.