Identification of an alternative reference microorganism to *Aspergillus brasiliensis* DSM 1988 for Pulsed Light

Avignon : December, 2019

1 – CONTEXT - OBJECTIVE

First experiments conducted in 2018 for the sensitivity comparison study showed that *Aspergillus brasiliensis* DSM 1988 sourced from Fraunhofer IVV and *Penicillium chrysogenum* (wild strain from Claranor collection) have the same sensitivity to PL.

To complete this study further investigations were performed to take into account the genetic diversity by testing on commercial suspension of *P. chrysogenum* coming from public collections (DSM, ATCC). This will also permit to indicate a specific strain and a public source for this microorganism.

The following strains were exposed to PL treatment at different fluences :

- *P. chrysogenum* ATCC 10106 (from Icare laboratory)
- *P; chrysogenum* ATCC 10106 (suspension prepared by Claranor)
- *P. chrysogenum* DSM 844 (suspension prepared by Fraunhofer IVV)
- *P. chrysogenum* DSM 848 (suspension prepared by Fraunhofer IVV)
- *P. chrysogenum* DSM 848 (suspension prepared by Biotecon)

2 – RESULTS

Inactivation kinetics obtained from these strains showed that experimental points for *Aspergillus brasiliensis* DSM 1988 and *Penicillium chrysogenum* DSM 844 were rather juxtaposed. Results for each strain are shown in Table 1 and Fig1.

Table 1: Resistance of *A. brasiliensis* DSM 1988 and *P. chrysogenum* DSM 844 to PL at different fluences.

Log10 reduction in conidiospores after PL treatment at 2500 V with 1 flash

Strain	***Aspergillus brasiliensis*** From Fraunhofer IVV : **DSM 1988**				***Penicillium chrysogenum*** From Fraunhofer IVV : **DSM 844**	
	Exp. 1		Exp. 2		Exp.1	
N0 (cfu)	89 000		460 000		110 000	
Fluence (J/cm²)						
1,10	>4,95	>4,95	>5,66	>5,66	5,04	4,56
0,74	4,95	>4,95	nt	nt	4,26	3,96
0,52	4,30	4,30	4,81	4,57	3,13	3,12
0,41	nt	nt	1,79	1,85	1,06	1,51
0,30	1,00	1,00	0,88	0,85	0,79	0,64
0,23	0,90	0,80	0,66	0,63	0,4	0,12

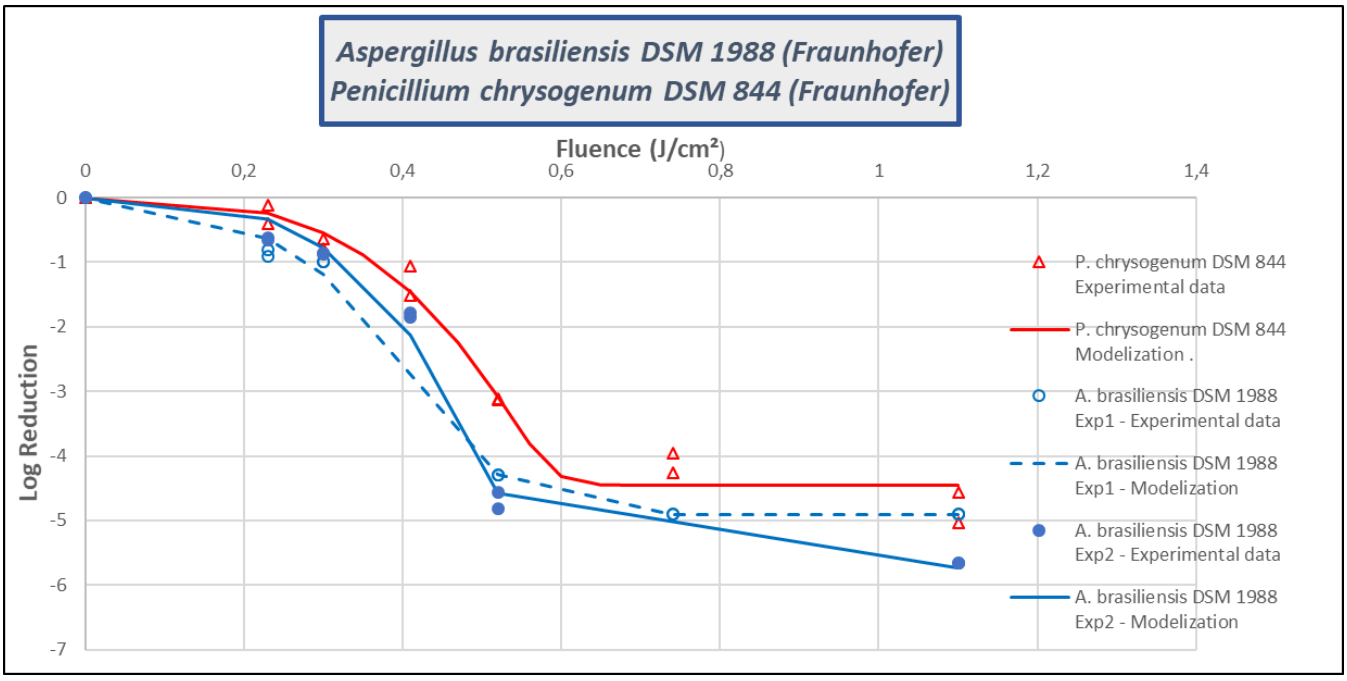

Fig. 1. Inactivation by exposure to PL of Conidiospores of *A. brasiliensis* and *P. chrysogenum*. Symbols represent experimental data, the line represent the reduction curve fitted by the Weibull model.

3 – CONCLUSION

This comparison study shows that *Penicillium chrysogenum* DSM 844 (sourced from Fraunhofer IVV) corresponds to an appropriate substitute :

- rather similar resistance (even slightly higher) to *A. brasiliensis*
- mold, adapted for high acid or ESL products , Class IV VDMA hygienic lines.
- inactivation curve with a shoulder.

Considering this situation, *Penicillium chrysogenum* DSM 844 with Fraunhofer IVV as a public source can be proposed as an alternative reference microorganism for evaluating the efficiency of pulsed light treatment.

Further investigations will be initiated to reinforce those results :

- multiplication of samples
- test with other suppliers and batches
- comparison to other strains.

Alain Berbérian
Microbiology Manager
Claranor SA
aberberian@claranor.com

REFERENCES

Levy C, Bornard I, Carlin F.(2011) Deposition of *Bacillus subtilis* spores using an airbrush-spray or spots to study surface decontamination by pulsed light. *Journal of Microbiological Methods* **84** : 223-227

Levy C, Aubert X, Lacour B & Carlin F (2012) Relevant factors affecting microbial surface decontamination by pulsed light. *International Journal of Food Microbiology* **152**: 168-174.

VDMA (Verband Deutscher Maschinen- und Anlagenbau) - Documents Food Processing Machinery and Packaging Machinery Hygienic Filling Machines of VDMA Class IV for Liquid and Viscous Foods. Minimum requirements and basic conditions for operation in accordance with specification. 2005/ No. 10 May 2005 (English edition: November 2005).

CLARANOR – Compared sensitivity to pulsed light of *Aspergillus brasiliensis* and *Penicillium chrysogenum* (October 2018).

CLARANOR – Identification of an alternative reference microorganism to *A. brasiliensis* DSM 1988 for Pulsed Light (Document presentation by Christophe Riedel – VDMA, 25th October 2019).