

SafeGrains

Contamination of stored grain and derivatives by insect pests and fungi (PTDC/ASP-PLA/28350/2017)

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Most abundant species:

- [1] *Sitophilus zeamais*
- [2] *Oryzaephilus surinamensis*
- [3] *Cryptolestes ferrugineus*



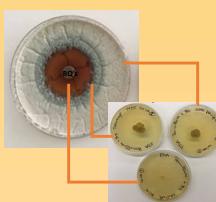
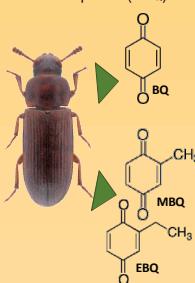
Detecting *Trogoderma granarium* (Coleoptera, Dermestidae) in storage facilities in Portugal



No *T. granarium* in Portugal!
Detection campaign is ongoing in 2021

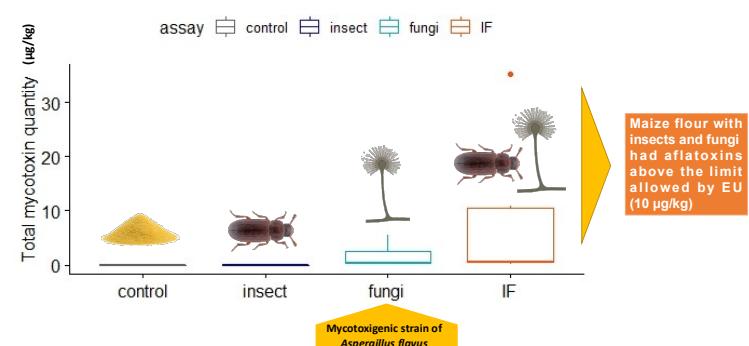
Interaction between *Tribolium castaneum* (Coleoptera, Tenebrionidae) and fungi

T. castaneum excretes 1,4 - benzoquinones (BQ): a mixture of ethyl-1,4-benzoquinone (EBQ) plus methyl-1,4-benzoquinone (MBQ)



Fungistatic effect of BQ and MBQ+EBQ on fungi: *Aspergillus flavus*, *A. niger*, *Fusarium* sp., and *Penicillium* sp. (only BQ)

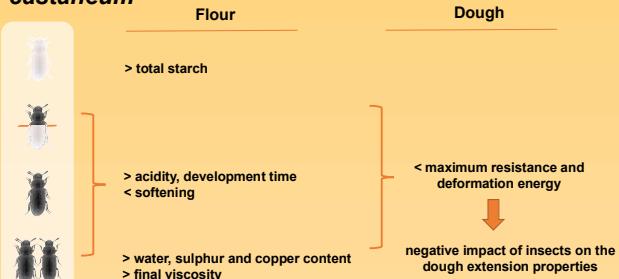
Fungicidal effect of MBQ+EBQ on *Penicillium* sp.



T. castaneum has:

- high protein content
- high essential aminoacids content
- well balanced fatty acids profile
- rich minerals content (especially phosphorous, potassium and sulphur)

Rheological properties of wheat flour infested by *T. castaneum*



Nutritional and chemical evaluation of *T. castaneum* reared on wheat flour

	Larvae	Pupae	Adults
Water content (%)	56.4 ± 0.62 a	54.3 ± 0.06 a	46.9 ± 1.56 b
Ash content (%)	1.15 ± 0.00 a	1.00 ± 0.05 b	1.16 ± 0.08 a
Crude fat (%)	6.36 ± 1.01 a	6.41 ± 0.89 a	7.24 ± 0.17 a
Crude fibre (%)	1.9 a	2.0 a	15.1 b
Crude protein (%)	15.30 ± 0.18 a	15.56 ± 0.23 a	16.97 ± 0.87 b
Nitrogen free extract (%)	18.95 ± 1.05 a	20.71 ± 0.99 a	12.65 ± 1.46 b

Aminoacids >Valine >Lysine >Histidine

