Updated list of QPS status recommended biological agents in support of EFSA risk assessments

The list of QPS status recommended biological agents (EFSA BIOHAZ Panel, 2020b) is being maintained in accordance with the mandate of the BIOHAZ Panel (2020-2022). Possible additions to this list are included around every 6 months, with the last Panel Statement (14) adopted in June 2021 (EFSA BIOHAZ Panel, 2021b). These additions are published as updates to the Scientific Opinion (EFSA BIOHAZ Panel, 2020b) and, as of January 20128, also as supporting information linked to every Panel Statement available on the Knowledge Junction at https://doi.org/10.5281/zenodo.1146566.

Table 1: Updated list of QPS status recommended biological agents for safety risk assessments carried out by EFSA Scientific Panels and Units

Bacteria			
Gram-positive non-spore forming bacteria			
Species			**Qualifications[a]**
Bifidobacterium adolescentis *Bifidobacterium animalis*	*Bifidobacterium bifidum* *Bifidobacterium breve*	*Bifidobacterium longum*	
Carnobacterium divergens[f]			
Corynebacterium ammoniagenes[r]	*Corynebacterium glutamicum*[b]		QPS applies for production purposes only.[n],[o]
Lactobacillus acidophilus *Lactobacillus amylolyticus* *Lactobacillus amylovorus* *Lactobacillus animalis*[k],[t] *Lactobacillus alimentarius* *Lactobacillus aviaries* *Lactobacillus brevis* *Lactobacillus buchneri* *Lactobacillus casei*[c] *Lactobacillus cellobiosus* *Lactobacillus collinoides* *Lactobacillus coryniformis* *Lactobacillus crispatus* *Lactobacillus curvatus*	*Lactobacillus delbrueckii* *Lactobacillus dextrinicus*[s] *Lactobacillus diolivorans*[i] *Lactobacillus farciminis* *Lactobacillus fermentum* *Lactobacillus gallinarum* *Lactobacillus gasseri* *Lactobacillus helveticus* *Lactobacillus hilgardii* *Lactobacillus johnsonii* *Lactobacillus kefiranofaciens* *Lactobacillus kefiri* *Lactobacillus mucosae*	*Lactobacillus panis* *Lactobacillus paracasei* *Lactobacillus parafarraginis*[t] *Lactobacillus paraplantarum* *Lactobacillus pentosus* *Lactobacillus plantarum* *Lactobacillus pontis* *Lactobacillus reuteri* *Lactobacillus rhamnosus* *Lactobacillus sakei* *Lactobacillus salivarius* *Lactobacillus sanfranciscensis*	
Lactococcus lactis			
Leuconostoc citreum *Leuconostoc lactis*	*Leuconostoc mesenteroides*	*Leuconostoc pseudomesenteroides*	
Microbacterium imperiale[f]			QPS only applies when the species is used for enzyme production.
Oenococcus oeni			
Pasteuria nishizawae[h]			
Pediococcus acidilactici	*Pediococcus parvulus*[i]	*Pediococcus pentosaceus*	
Propionibacterium acidipropionici	*Propionibacterium freudenreichii*		
Streptococcus thermophilus			

Gram-positive spore-forming bacteria			
Bacillus			
Species			**Qualifications[a]**
Bacillus amyloliquefaciens *Bacillus atrophaeus* *Bacillus circulans*[v] *Bacillus clausii* *Bacillus coagulans* *Bacillus flexus*[i]	*Bacillus fusiformis* *Bacillus lentus* *Bacillus licheniformis* *Bacillus megaterium* *Bacillus mojavensis* *Bacillus paralicheniformis*[w]	*Bacillus pumilus* *Bacillus smithii*[j] *Bacillus subtilis* *Bacillus vallismortis* *Bacillus velezensis*[t]	Absence of toxigenic activity. In the case of *Bacillus circulans*, for production purposes only and absence of cytotoxic activity. In the case of *Bacillus paralicheniformis*, absence of genetic information to synthesize bacitracin. In the case of *Bacillus velezensis*, absence of toxigenic potential and absence of aminoglycoside production ability.
Geobacillus stearothermophilus			Absence of toxigenic activity.
Paenibacillus illinoisensis[t]			QPS applies for production purposes only[n] and absence of toxigenic potential.
Parageobacillus thermoglucosidasius[t]			QPS applies for production purposes only[n] and absence of toxigenic potential.
Gram-negative bacteria			
Species			**Qualifications[a]**
Cupriavidus necator[t]			QPS applies for production purposes only.[n]
Gluconobacter oxydans			QPS only applies when the species is used for vitamin production.
Komagataeibacter sucrofermentans[p],[q]			QPS applies for production purposes only.[n]
Xanthomonas campestris[g]			QPS only applies when the species is used for the production of xanthan gum.
Yeasts[e]			
Species			**Qualifications**
Candida cylindracea[f]			QPS only applies when the species is used for enzyme production.
Cyberlindnera jadinii			
Debaryomyces hansenii			
Hanseniaspora uvarum			
Kluyveromyces lactis	*Kluyveromyces marxianus*		
Komagataella pastoris	*Komagataella phaffii*[l]		QPS only applies when the species is used for enzyme production.
Lindnera jadinii			QPS only applies when the species is used for enzyme production.
Ogataea angusta			QPS only applies when the species is used for enzyme production.
Saccharomyces bayanus	*Saccharomyces cerevisiae*[d]	*Saccharomyces pastorianus*	In the case of *Saccharomyces cerevisiae* the general qualification[u] applies for yeast strains able to grow above 37°C.
Schizosaccharomyces pombe			

Wickerhamomyces anomalus			QPS only applies when the species is used for enzyme production.
Xanthophyllomyces dendrorhous			
Yarrowia lipolytica(m)			QPS applies for production purposes only.(n)
Zygosaccharomyces rouxii(t)			
Viruses			
Plant viruses			
Family			
Alphaflexiviridae	Potyviridae		
Insect viruses			
Family			
Baculoviridae			
Protists/Algae			
Aurantiochytrium limacinum(t) *Euglena gracilis*(r) *Tetraselmis chuii*(t)			QPS applies for production purposes only.(n)

QPS: Qualified Presumption of Safety.
A specific representative of a QPS proposed taxonomic unit, does not need to undergo a further safety assessment other than to satisfy the specified qualifications, if applicable. On the other hand, representatives of taxonomic units that fail to satisfy a qualification would be considered unfit for the QPS list and would remain subject to a full safety assessment, in the frame of a notification by the responsible EFSA Scientific Panel.

(a): Generic qualification for all QPS bacterial taxonomic units: the strains should not harbour any acquired antimicrobial resistance genes to clinically relevant antimicrobials.
(b): *Brevibacterium lactofermentum* is a synonym of *Corynebacterium glutamicum*.
(c): The previously described species '*Lactobacillus zeae*' has been included in the species *Lactobacillus casei.*
(d): *Saccharomyces cerevisiae*, subtype *boulardii* is contraindicated for persons with fragile health, as well as for patients with a central venous catheter in place.
(e): Yeast synonyms commonly used in the feed/food industry:
- *Cyberlindnera jadinii*: synonyms *Lindnera jadinii*, *Pichia jadinii*, *Hansenula jadinii*, *Torulopsis utilis*, anamorph *Candida utilis*;
- *Debaryomyces hansenii*- anamorph *Candida famata*;
- *Hanseniaspora uvarum*- anamorph *Kloeckera apiculata*;
- *Kluyveromyces lactis*- anamorph *Candida spherica*;
- *Kluyveromyces marxianus*- anamorph *Candida kefyr*;
- *Komagataella pastoris*- synonym *Pichia pastoris*;
- *Lindnera jadinii*- synonyms *Pichia jadinii*, *Hansenula jadinii*, *Torulopsis utilis*, anamorph *Candida utilis*;
- *Ogataea angusta*- synonym *Pichia angusta*;
- *Saccharomyces cerevisiae*- synonym *Saccharomyces boulardii*;
- *Saccharomyces pastorianus*- synonym *Saccharomyces carlsbergensis*;
- *Wickerhamomyces anomalus*- synonyms *Hansenula anomala*, *Pichia anomala*, *Saccharomyces anomalus*, anamorph *Candida pelliculosa*;
- *Xanthophyllomyces dendrorhous*- anamorph *Phaffia rhodozyma*.

(f): Microorganisms recommended in the Panel Statement published in December 2014 (EFSA BIOHAZ Panel, 2014).
(g): Microorganisms recommended in the Panel Statement published in June 2015 (EFSA BIOHAZ Panel, 2015a).
(h): Microorganisms recommended in the Panel Statement published in December 2015 (EFSA BIOHAZ Panel, 2015b).
(i): Microorganisms recommended in the Panel Statement published in July 2016 (EFSA BIOHAZ Panel, 2016).
(j): Microorganisms recommended in the Panel Statement published in March 2017 (EFSA BIOHAZ Panel et al., 2017a).
(k): Microorganisms recommended in the Panel Statement published in July 2017 (EFSA BIOHAZ Panel, 2017b).
(l): Microorganisms recommended in the Panel Statement published in January 2018 (EFSA BIOHAZ Panel, 2018a).
(m): Microorganisms recommended in the Panel Statement published in July 2018 (EFSA BIOHAZ Panel, 2018b).
(n): The qualification 'for production purpose only' implies the absence of viable cells of the production organism in the final product and can also be applied for food and feed products based on microbial biomass.
(o): In relation to *Corynebacterium glutamicum*, the qualification that QPS only applies when the species is used for amino acid production was extended to other production purposes in the Panel Statements published in January and July 2019 (EFSA BIOHAZ Panel, 2019a, b).
(p): Basonym *Acetobacter xylinus* subsp. *sucrofermentans*.
(q): Microorganisms recommended in the Panel Statement published in January 2019 (EFSA BIOHAZ Panel, 2019a).
(r): Microorganism recommended in the Panel Statement published in July 2019 (EFSA BIOHAZ Panel, 2019b).
(s): *Lactobacillus dextrinicus* (Coster and White 1964) Haakensen et al. 2009, comb. nov., previously *Pediococcus dextrinicus* (Coster and White 1964) Back 1978. Name change indicated in the Panel Statement published in July 2019 (EFSA BIOHAZ Panel, 2019b).
(t): Microorganisms recommended in the Panel Statement published in January 2020 (EFSA BIOHAZ Panel, 2020). Aurantiochytrium limacinum synonym Schizochytrium limacinum added in the Panel Statement published in July 2021 (EFSA BIOHAZ Panel 2021b).

(u): Absence of antimycotic resistance should be proved if the yeasts are to be used as viable organisms in the food and feed chains.
(v): Microorganism recommended in the Panel Statement published in January 2021 (EFSA BIOHAZ Panel, 2021a).
(w): Microorganism recommended in the Panel Statement published in July 2021 (EFSA BIOHAZ Panel 2021b).

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