

## Supplementary Table: A comprehensive summary of the xenobiotic biodegradation studies on *Phanerochaete spp.*

Chemical Name	Strain name	Mode of Degradation	Culture conditions and/or Enzyme system	Reference
<b>I. Aromatic and aliphatic hydrocarbons</b>				
<b>1. PCBs and related compounds</b>				
PCBs (Aroclors 1242, 1254 and 1260)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Degradation	LN(↓),HN (↑),ME(↑↑)	Yadav et al. 1995a
4,4'-dichlorobiphenyl (4,4'-DCB)	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Mineralization	LN	Dietrich et al. 1995
	<i>Phanerochaete</i> sp.MZ142	Degradation	LN (↓), PDB (↑)/P450	Kamei et al. 2006
	<i>P. chrysosporium</i> ATCC34541	Degradation	LN (↑), PDB (↓)/P450	
3,3',4,4'-tetrachlorobiphenyl (3,3',4,4'-TCB)	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Mineralization	LN	Dietrich et al. 1995
	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
2,2',4,4',5,5'-hexachlorobiphenyl (2,2',4,4',5,5'-HCB)	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Mineralization	LN	Dietrich et al. 1995
	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
2,2',4,4'-tetrachlorobiphenyl (2,2',4,4'-TCB)	<i>P. chrysosporium</i> strain BKM-F-1767 (ATCC 24725)	Mineralization	LN/LDS and Other enzymes	Thomas et al. 1992
2-Chlorobiphenyl				
Biphenyl				
Aroclor 1242	<i>P. chrysosporium</i> (ATCC 32629)	Degradation	MMN	Viney and Bewley 1990
2,3-dichlorobiphenyl,		Degradation <sup>1</sup>		
4,4'-dichlorobiphenyl,		Degradation <sup>1</sup>		
2,4',5-trichlorobiphenyl,		Degradation <sup>1</sup>		
2,2',3,3'-tetrachlorobiphenyl,		Degradation <sup>1</sup>		
2, 2', 4, 5, 5'-pentachlorobiphenyl,		Degradation <sup>1</sup>		
2, 2', 4, 4', 5, 5'-hexachlorobiphenyl		Degradation <sup>1</sup>		
Penta- and hepta- Chlorobiphenyl (CB)	<i>P. chrysosporium</i>	Degradation	SB and Cont. Soil	Fernández-Sánchez et al. 2001
2,3-dichlorobiphenyl (2,3-DCB),	<i>P. chrysosporium</i> ATCC 24725	Mineralization	LN, ME/Non-LDS	Beaudette et al. 1998
4,49-dichlorobiphenyl(4,49-DCB),				
2,49,5-trichlorobiphenyl (2,49,5-TCB),				
2,29,4,49-tetrachlorobiphenyl(2,29,4,49-TeCB),				
2,29,5,59-tetrachlorobiphenyl (2,29,5,59-TeCB),				
2,29,4,49,5,59-hexachlorobiphenyl (2,29,4,49,5,59-HCB)				
Delor 103 and Delor 105	<i>P. chrysosporium</i>	Degradation	LN (no activity),HN/ Non-LDS	Krčmar and Ulrich 1998
Delor 106	<i>P. chrysosporium</i>	Degradation	LN/MnP, LiP and Laccase	Novotný et al. 1997
Aroclor 1254	<i>P. chrysosporium</i> BKM-F1767 (ATCC20696)	Mineralization	LN <sup>96</sup>	Eaton 1985
Flame retardents [Polybrominated diphenyl ethers (PBDEs)]	<i>P. chrysosporium</i>	Degradation	LN	Zhou et al. 2007
Decabromodiphenyl ether (BDE-209)				
<b>2. Dioxins and dibenzofurans</b>				
Dibenzo-p-dioxin (DD)	<i>P. chrysosporium</i>	Degradation	LN/LiP	Joshi and Gold 1994
	<i>P. chrysosporium</i> (ATCC 24725)	Oxidation <sup>@</sup>	LiP	Hammel et al. 1986
2-chlorodibenzo-p-dioxin (2-CDD)	<i>P. chrysosporium</i> (ATCC 24725)	Oxidation <sup>@</sup>	LiP	Hammel et al., 1986
2,7-dichlorodibenzo-p-dioxin (2,7-diCDD)	<i>P. chrysosporium</i> OGC101	Degradation	LN/LiP, MnP and IE	Valli et al. 1992b
2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
2,3,7,8-TetraCDD	<i>P. sordida</i> YK-624 and <i>P. chrysosporium</i> IFO31249	Degradation	LN	Takada et al. 1996

1,2,3,7,8-PentaCDD  
 1,2,3,4,7,8-HexaCDD  
 1,2,3,4,6,7,8-HeptaCDD  
 1,2,3,4,6,7,8,9-OctaCDD  
 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)  
 1,2,3,7,8-PentaCDF  
 1,2,3,4,7,8-HexaCDF  
 1,2,3,4,6,7,8-HeptaCDF  
 1,2,3,4,6,7,8,9-OctaCDF

### 3. PAHs

Creosote (Phenanthrene, Anthracene, Fluoranthene, Pyrene, Triphenylene, Benzo[ <i>a</i> ]anthracene, Chrysene, Benzo[ <i>e</i> ]pyrene, Benzo [ <i>b</i> ]fluorathene, Benzo[ <i>k</i> ]fluorathene, benzo[ <i>a</i> ]pyrene, Benzo[ <i>ghi</i> ]perylene)	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN/MnP-LPS	Bogan and Lamar 1995
Anthracene oil (Dibenzofuran, Fluorene, Methylbiphenyl, 9 <i>H</i> -Xanthene, Methylidibenzofuran, 1-Methylfluorene, Dibenzothiophene, Phenanthrene, Anthracene, Carbazole, 3-Methylphenanthrene, 2-Methylphenanthrene, Fluoranthene, 4 <i>H</i> -Cyclopenta[ <i>de</i> ]phenanthrene, 4- and/or 9-Methylphenanthrene, Pyrene, Phenylanthralene, Benzo[ <i>a</i> ]fluorine, Benzo[ <i>b</i> ]fluorine, 1-Methylpyrene, Benz[ <i>a</i> ]anthracene)	<i>P. chrysosporium</i> BKM-F-1767	Mineralization	LN	Bumpus 1989
Acenaphthene, fluorene, phenanthrene, fluoranthene, pyrene, chrysene, benzo( <i>a</i> )pyrene, dibenz( <i>a-h</i> )anthracene and benzo( <i>ghi</i> )perylene.	<i>P. chrysosporium</i>	Degradation	LN	Zheng and Obbard 2002
Pyrene	<i>P. chrysosporium</i> (ATCC 24725)	Oxidation <sup>@</sup>	LiP	Hammel et al. 1986
	<i>P. chrysosporium</i> ATCC 24725	Degradation	LN	Zheng and Obbard 2002
	<i>P. chrysosporium</i>	Degradation	LN/LiP and MnP	Wang et al. 2009
Anthracene	<i>P. chrysosporium</i> BKM-F-1767	Degradation	LN	Field et al. 1992
	<i>P. chrysosporium</i> (ATCC 24725)	Mineralization	LN/LDS (LiP ↑)	Hammel et al. 1991
	<i>P. chrysosporium</i>	Degradation	LN/Non-LDS	Vyas et al. 1994
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC24725)	Degradation	LN/LiP	Bogan et al. 1996a
	<i>P. chrysosporium</i> (1557)	Degradation	LN/MnP	Mohammadi and Nasernejad 2009
	<i>P. laevis</i> HHB-1625	Transformation	LN/MnP and Mn(II)-LPS	Bogan and Lamar 1996
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN	Field et al. 1992
Phenanthrene	<i>P. chrysosporium</i> BKM-F1767 (ATCC 24725)	Mineralization	LN, HN/Non-LDS	Dhawale et al. 1992
	<i>P. chrysosporium</i> ME446 (ATCC 34541)			
	<i>P. chrysosporium</i> ME446-B5 ( <i>Lip</i> <sup>-</sup> , <i>Mnp</i> <sup>-</sup> )			
	<i>P. chrysosporium</i> ME446-B19 (homokaryotic)			
	<i>P. chrysosporium</i> (ATCC 24725)			
	<i>P. chrysosporium</i> (INA-12)	Mineralization	PDB/ no LiP	Barclay et al. 1995
	<i>P. chrysosporium</i> (ATCC 24725)	Oxidation <sup>@</sup>	MnP-LPS	Moen et al. 1994
	<i>P. chrysosporium</i> ATCC 24725	Mineralization	ME/Non-LDS	Morgan et al. 1991

	<i>P. chrysosporium</i> ATCC 20696			
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Degradation	ME/P450 and EH	Sutherland et al. 1991
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Mineralization <sup>#</sup>	NL/P450	Kanaly et al. 2006
	<i>P. chrysosporium</i> INA-12	Degradation	HN and Cont. Soil	Brodkorb and Legge 1992
	<i>P. laevis</i> HHB-1625	Transformation	LN/MnP and Mn(II)-LPS	Bogan and Lamar 1996
	<i>P. chrysosporium</i>	Oxidation <sup>@</sup>	LiP H8	Tatarko and Bumpus 1993
	<i>P. chrysosporium</i>	Degradation	LN/LiP and MnP	Wang et al. 2009
PAH mixture (fluorene, phenanthrene, anthracene, Pyrene and benzo(a)pyrene) Fluorene, anthracene, pyrene and benz(a)anthracene	<i>P. chrysosporium</i>	Degradation	LN	Tekere et al. 2005
Fluorene	<i>P. chrysosporium</i> BKM-F1767 (ATCC 24725)	Degradation	NGM and Cont. Soil	George and Neufeld 1989
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Transformation	LN/MnP-LPS	Bogan et al. 1996b
Chrysene	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN/MnP	Bogan et al. 1996b
Acenaphthene, Fluorene, Phenanthrene and Anthracene	<i>P. chrysosporium</i> IMI 232175	Degradation	Straw and Cont. Soil	Canet et al. 2001
Benzo[a]pyrene	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
	<i>P. chrysosporium</i> BKM-F-1767	Degradation	LN	Field et al. 1992
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)			
	<i>P. chrysosporium</i>	Transformation	Cont. Soil	Qiu and McFarland 1991
	<i>P. chrysosporium</i> BKM-F-1767	Transformation	Corn cobs/Cont. Soil	McFarland and Qiu 1995
	<i>P. chrysosporium</i> (ATCC 24725)	Oxidation <sup>@</sup>	LiP	Sanglard et al. 1986
	<i>P. chrysosporium</i> ATCC 24725	Oxidation <sup>@</sup>	LiP	Haemmerli et al. 1986
	<i>P. chrysosporium</i> CDBB-H298	Degradation	SB and Cont. Soil	Dzul-Puc et al. 2005
	<i>P. laevis</i> HHB-1625	Transformation <sup>@</sup>	MnP and Mn(II)-LPS	Bogan and Lamar 1996
	<i>P. chrysosporium</i> (INA-12)	Mineralization	PDB	Barclay et al. 1995
	<i>P. chrysosporium</i> CDBB-H298	Degradation	SB and Cont. Soil	Dzul-Puc et al. 2005
	<i>P. chrysosporium</i>	Degradation	LN/LiP and MnP	Wang et al. 2009
	<i>P. chrysosporium</i>	Oxidation <sup>@</sup>	P450 (microsomal and soluble)	Masaphy et al. 1996
Benz[a]anthracene	<i>P. laevis</i> HHB-1625	Transformation <sup>@</sup>	MnP and Mn(II)-LPS	Bogan and Lamar 1996
<b>4. Phenolics and chlorophenolics</b>				
Phenol	<i>P. chrysosporium</i>	Degradation	ME and Cont. Soil	Krivobok 1994
Polyvinyl alcohol (PVA)	<i>P. chrysosporium</i>	Degradation	LN/MnP	Huang et al. 2002
4-tert-octylphenol	<i>P. sordida</i> YK-624	Degradation	LN/MnP and Laccase	Tamagawa et al. 2007
<i>p</i> -Cresol and Phenol <sup>1</sup>	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN/LiP and MnP	Kennes and Lema 1994
2,4,6-trichlorophenol	<i>P. chrysosporium</i> OGC101	Mineralization	LN/LiP and MnP	Reddy et al. 1998
	<i>P. chrysosporium</i> (ATCC 24725)	Degradation	LN/ECE and IE	Armenante et al. 1994
	<i>P. chrysosporium</i> (ATCC 24725)	Degradation	LN/ECE and IE	Pal et al. 1995
2,4,5-Trichlorophenol	<i>P. chrysosporium</i> OGC101	Mineralization	LN/LiP and MnP	Joshi and Gold 1993
2-chlorophenol	<i>P. chrysosporium</i> ATCC 24725	Degradation	LN/LiP	Ruckenstein and Wang 1994
<b>5. Volatile organic compounds (VOCs), solvents, and organic acids:</b>				
BTEX (Benzene, Toluene, Ethylbenzene and xylenes)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Degradation	ME	Yadav and Reddy 1993b
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)			
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)(LiP, Mnp)			

Aromatic hydrocarbons (benzene, ethylbenzene, toluene, and styrene), ketones (methyl ethyl ketone, methyl isobutyl ketone, and methyl propyl ketone), and organic acids ( <i>n</i> -butyl acetate, ethyl 3-ethoxypropionate)	<i>P. chrysosporium</i> (ATCC 24725)	Degradation	Cont. sample	Qi et al. 2002
Xylene and Toluene (in vapor form)	<i>P. chrysosporium</i> ATCC20696	Degradation	Aerobic degradation	Jorio et al. 2009
Benzoic acid (BA), 4-hydroxybenzoic acid (4-HBA), catechol (CAT, 1,2-dihydroxybenzene) and protocatechuic acid	<i>P. chrysosporium</i> Burdsall and Eslyn, strain 1556	Degradation	Cont. Soil	Dittmann et al. 2002
<i>p</i> -hydroxybenzoic acid, Vanillic acid, Ferulic acid	<i>P. chrysosporium</i>	Degradation	Cont. Soil	Xu et al. 2008
Tetrathalic acid (TA)	<i>P. chrysosporium</i>	Degradation	LN/MnP	Yan et al. 2004
Humic acid	<i>P. chrysosporium</i> BKM-F 1767	Degradation	LN	Blondeau 1989
Chlorobenzene (gas phase)	<i>P. chrysosporium</i>	Degradation	LN(↑)	Wang et al. 2008
<i>mono</i> -, <i>di</i> -, Chloro benzenes (and Toluene)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Mineralization	ME(↑↑),HN(↑),LN(↓)	Yadav et al. 1995b
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)( <i>Lip</i> <sup>+</sup> , <i>MnP</i> <sup>+</sup> )			
3,4-dichloroaniline(DCA)	<i>P. chrysosporium</i> ATCC 34541	Mineralization	LN, HN, NL	Sandermann et al. 1998
TCE (Trichloroethylene)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Mineralization	ME(↑↑),HN(↑),LN(↓)	Yadav et al. 2000
4-Chlorophenol	<i>P. chrysosporium</i> HD	Degradation	LN(↑↑), HN(↑), NL(↓)	Zouari et al. 2002
4-Chloroaniline	<i>P. chrysosporium</i>	Oxidation <sup>@</sup>	LiP (H2)	Chang and Bumpus 1993
	<i>P. chrysosporium</i> Burds. (ATCC 24725)	Mineralization	LN and Cont. Soil	Arjmand and Sandermann 1985
3,4-Dichloroaniline	<i>P. chrysosporium</i> Burds. (ATCC 24725)	Mineralization	ME	Morgan et al. 1991
	<i>P. chrysosporium</i> ATCC 24725			
	<i>P. chrysosporium</i> ATCC 20696			
<b>6. Miscellaneous:</b>				
Thianthrene	<i>P. chrysosporium</i> BKM-F-1767	Oxidation <sup>@</sup>	LiP	Schreiner et al. 1988
Dibenzyl sulfide	<i>P. chrysosporium</i> ATCC 24725	Oxidation	GMV/LiP and P450	Van Hamme et al. 2003
Thioanisole	<i>Phanerochaete chrysosporium</i> ME-446 (ATCC 34541)	Oxidation <sup>@</sup>	LiP	Bruck et al. 2003
<i>p</i> -methoxythioanisole				
<i>n</i> -alkanes <sup>A</sup>	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Mineralization <sup>#</sup>	NL/P450	Kanaly et al. 2006
3,4-dimethoxytoluene	<i>P. chrysosporium</i> strain OGCI01	Oxidation <sup>@</sup>	LiP	Joshi and Gold 1996
1,4-dimethoxybenzene	<i>P. chrysosporium</i> strain OGCI01			
Aryl alkyl sulfides (4-XC <sub>6</sub> H <sub>4</sub> SR)	<i>P. chrysosporium</i> BKM-1767 (ATCC 24725)	Oxidation <sup>@</sup>	LiP	Bacocchi et al. 2000
4-methoxybenzyltrimethylsilane	<i>P. chrysosporium</i>	Oxidation <sup>@</sup>	LiP	Gerini and Lanzalunga 2003
Linear alkylbenzene sulfonate (LAS)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Transformation	LN(↓),HN (↑),ME(↑↑)	Yadav et al. 2001
	<i>P. chrysosporium</i> ME-446 (Lip-,MNP-)			
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)(der8-5)			
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)(Lip5b-)			

## II. Herbicides / Pesticides / Insecticides

DDT [1,1-bis(4-chlorophenyl)-2,2,2-trichloroethane]	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
	<i>P. chrysosporium</i> BKM-F-1767 and ME-446	Mineralization	LN	Bumpus and Aust 1987
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN/Non-LDS <sup>@</sup>	Köhler et al. 1988

Isoxaflutole (produce Diketonitrile)	<i>P. chrysosporium</i> strain H-298 (CDBB)	Degradation	Cont. sample	Corona-Cruz et al. 1999
$\beta$ -Cyfluthrin	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	LN	Mougin et al. 2000
Methoxychlor (1,1,1-trichloro-2,2-bis(4-methoxyphenyl)ethane)	<i>P. chrysosporium</i>	Degradation	Czapek Dox medium	Saikia and Gopal 2004
	<i>P. chrysosporium</i> (ATCC 24725)	Mineralization	LN/P450?	Grifoll and Hammel 1997
	<i>P. chrysosporium</i> (ME-446)	Dechlorination <sup>@</sup>	Lip,MnP and Laccase	Hirai et al. 2004
Chlorpyrifos, fonofos and terbufos	<i>P. chrysosporium</i> BKM-F-1767	Mineralization	LN	Bumpus et al. 1993
Parathion, Terbufos, azinphos-methyl, phosmet and tribufos	<i>P. chrysosporium</i> 3641	Degradation	Cereal-bran medium/P450 <sup>†</sup>	Jauregui et al. 2003
2,4-dichlorophenol	<i>P. chrysosporium</i> OGC101	Mineralization	LN/Lip, MnP and IE	Valli and Gold 1991
	<i>P. chrysosporium</i>	Biosorption	LN and Cont. sample	Wu and Yu 2006
	<i>P. chrysosporium</i>	Biosorption	LN and Cont. sample	Wu and Yu 2007
	<i>P. chrysosporium</i> BKM-F-1767	Degradation	LN, Soil and corn cobs	Kennedy et al. 1990
Alkyl halide insecticides (Aldrin, dieldrin, heptachlor, chlordane, lindane and Mirex)				
Dieldrin	<i>P. chrysosporium</i> ATCC 24725	Mineralization	ME	Morgan et al. 1991
	<i>P. chrysosporium</i> ATCC 20696			
<i>N,N</i> -diethyl-m-toluamide (DEET)	<i>P. chrysosporium</i> BKM-F-1767	Degradation	LN	Seo et al. 2005
4-nitro-2,4-diazabutanal (NDAB)	<i>P. chrysosporium</i> ATCC 24725	Mineralization	LN/MnP	Fournier et al. 2004b
2,4-D (2,4-Dichlorophenoxyacetic acid)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Mineralization	LN(↓),HN(↑),ME(↑↑)	Yadav and Reddy 1993a
	<i>P. chrysosporium</i> ME-446 (ATCC 34541)( <i>Lip</i> <sup>+</sup> , <i>Mnp</i> <sup>+</sup> )			
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	<i>P. chrysosporium</i> (BKM-F-1767)	Mineralization	LN(↑),HN(↓)	Ryan and Bumpus 1989
	<i>P. chrysosporium</i> ME-446 (ATCC 34541) <sup>§</sup>	Mineralization	LN(↓),HN(↑),ME(↑↑)	Yadav and Reddy, 1993a
	<i>P. chrysosporium</i> ME-446 (ATCC 34541) ( <i>Lip</i> <sup>+</sup> , <i>Mnp</i> <sup>+</sup> )			
Pentachlorophenol (PCP)	<i>P. chrysosporium</i> BKM-F-1767	Mineralization	LN(↑),NL(↓)	Mileski et al. 1988
	<i>P. chrysosporium</i> ME-446 (ATCC31249)	Degradation	LN/LiP	Shim and Kawamoto 2002
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC24725)			
	<i>P. chrysosporium</i> (ATCC 3541)	Degradation	LN/MnP and Laccase	Ford et al. 2007
	<i>P. sordida</i> (ATCC 90628)			
	<i>P. chrysosporium</i> (ATCC 24725)			
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation	Cont. Soil	Lamar and Dietrich 1990
	<i>P. chrysosporium</i>	Transformation	LN/LiP	Longoria et al. 2008
	<i>P. chrysosporium</i> BKM-F-1767	Degradation	LN	Lin et al. 1991
	<i>P. chrysosporium</i>	Degradation	LN,HN	Aiken and Logan 1996
2,3,5,6-Tetrachlorophenol TCP	<i>P. chrysosporium</i>	Transformation	LN/LiP	Longoria et al. 2008
Atrazine	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Transformation	LN	Mougin et al. 1994
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	<i>N</i> -dealkylation	LN/P450	Mougin et al. 1997
Simazine, Propozine and terbuthylazine	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	<i>N</i> -dealkylation	LN/P450	Mougin et al. 1997
Alachlor	<i>P. chrysosporium</i>	Mineralization	ME	Ferrey et al. 1994
Endosulfan (1,4,5,6,7,7-hexachloro-5-nor-bornene-2,3-dimethanol cyclic sulfite)	<i>P. chrysosporium</i> BU-1	Degradation	LN(↓),HN(↑) /P450	Kulluman and Matsumura 1996
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, $\gamma$ -HCH)	<i>P. chrysosporium</i>	Degradation	LN/LDS	Bumpus et al. 1985
	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Transformation	LN/P450	Mougin et al. 1996
	<i>P. chrysosporium</i> ATCC 35541	Degradation	Soil extract broth	Fragoero and Magan 2005
Simazine, dieldrin and trifluralin (mixture)	<i>P. chrysosporium</i> (BKM-F-1767)	Degradation	LN/MnP	Castillo and Torstensson 2007
Metamitron				
Chloridazon				
Metribuzin				
Methabenzthiazuro				

Isoproturon  
Terbutylazine  
Linuron  
Irgarol 1051 (Anti-algal)

*P. chrysosporium*

Degradation

LN/MnP

Ogawa et al. 2004

### III. Munition wastes / Explosives

TNT (2,4,6-trinitrotoluene)

*P. chrysosporium*  
*P. chrysosporium* DSM 1556 (Burds ME-446)  
*P. chrysosporium* BKM-F-1767 (ATCC 24725)  
*P. chrysosporium*  
*P. chrysosporium* BKM-F-1767 (ATCC 24725)  
*P. chrysosporium* BKM-F-1767 (ATCC24725)  
*P. chrysosporium* BKM-F-1767

Degradation  
Degradation  
Mineralization  
Degradation  
Transformation  
Transformation  
Mineralization

Cont. Soil  
LN/LiP  
ME  
LN,HN (equal degradation)  
LN/MnP and LiP  
LN  
LN

Axtell et al. 2000  
Michels and Gottschalk 1994  
Spiker et al. 1992  
Stahl and Aust 1993  
Hawari et al. 1999  
Rho et al. 2001  
Hodgson et al. 2000  
Fernando et al. 1990  
Bayman et al. 1995

RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)<sup>+</sup>

*P. chrysosporium*  
*P. chrysosporium* Burdsall (ATCC 24725)  
*P. chrysosporium*  
*P. chrysosporium*  
*P. chrysosporium* ATCC 24725  
*P. chrysosporium* ATCC 24725

Transformation  
Mineralization  
Degradation  
Mineralization  
Mineralization

NL  
LN/MnP  
LN/MnP and CDH  
LN  
LN/MnP

Sheremata and Hawari 2000  
Stahl et al. 2001  
Fournier et al. 2004a  
Fournier et al. 2006

HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)  
CL-20 (2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexa-Azaisowurtzitane)

*P. chrysosporium* (ATCC-24725)  
*P. chrysosporium* BKM-F1767  
*P. chrysosporium*  
*P. chrysosporium* OGC101  
*P. chrysosporium* (ATCC 34541)  
*P. chrysosporium* (ATCC 34541)  
*P. chrysosporium* (ATCC 34541)

Degradation  
Degradation  
Degradation  
Mineralization  
Degradation  
Transformation  
Transformation

LN(↓),HN(↑)  
LN,ME  
LN,HN/P450  
LN/LiP, MnP and IE  
LN,HN/P450  
ME/P450  
ME/P450

Karakaya et al. 2009  
Jackson et al. 1999  
Teramoto et al. 2004a  
Valli et al. 1992a  
Teramoto et al., 2004b  
Servent et al. 1991 and 1992  
Ducrocq et al. 1990

4-Nitrophenol  
Nitroglycerin

### IV. Dyes

Phthalocyanine (textile dye remazol turquoise blue)

*P. chrysosporium* PC671

Degradation and Biosorption

LN and Cont. Sample

Conneely et al. 1999

Azo dyes :

4-phenylazophenol

*P. chrysosporium* OGC 101

Degradation

LN

Spadaro et al. 1992

4-phenylazo-2-methoxyphenol

*P. chrysosporium* OGC 101

4-phenylazoaniline

*P. chrysosporium* OGC 101

N-N-dimethyl-4-phenylazoaniline

*P. chrysosporium* OGC 101

Disperse Orange 3 [4-(4'-nitrophenylazo)-aniline]

*P. chrysosporium* OGC 101

Solvent Yellow 14 (1-phenylazo-2-naphthol)

*P. chrysosporium* OGC 101

Disperse yellow 3 [2-(4'-acetamidophenylazo)-

*P. chrysosporium* OGC 101

4-methyl-phenol](DY3)

Oxidation

LN/LiP and MnP

Spadaro and Renganathan 1994

1-(4'-acetamidophenylazo)-2-naphthol (NDY3)

Orange II

*P. chrysosporium* BKM-F-1767

Biodegradation

LN(↑),HN(↓)

Cripps et al. 1990

Tropaeolin O

*P. chrysosporium* BKM-F-1767

LN(↑),HN(↓)

Congo Red

*P. chrysosporium* BKM-F-1767

LN(↑),HN(↓)

Azure B (heterocyclic dye)

*P. chrysosporium* BKM-F-1767

LN(↑),HN(↓)

Astrazon Red FBL (Azo dye) <i>meta</i> - or <i>para</i> -aminosulphonic or aminobenzoic acids (guaiacol or syringol)	<i>P. chrysosporium</i> (1557) <i>P. chrysosporium</i> Burds MUM 95.01	Decolorization Decolorization	LN/LiP and MnP(↑) LN/LiP and GLOX	Sedighi et al. 2009 Martins et al. 2002
Direct violet 51 (DD), Reactive Black 5 (RB), Ponceau Xylidine (PX) and Bismark Brown R (BB)	<i>P. chrysosporium</i>	Decolorization	LN/MnP	Enayatzamir et al. 2010
4-(3-methoxy-4-hydroxyphenylazo)- [U-14C]benzenesulfonic acid, 19,4-(2-sulfo-3'-methoxy-4- hydroxyazobenzene-4-azo)-[U-14C]benzenesulfonic acid monosodium salt, Acid Yellow 9, Orange II, Orange I, Sulfanilic acid	<i>P. chrysosporium</i> Burds BKM-1667 (ATCC 24725)	Mineralization	LN and Cont. Sample	Paszczynski et al. 1992
Sulfonated azo dyes 4-(4'-sulfo-phenylazo)-2,6- dimethylphenol, Orange II [1-(4'-sulfo-phenylazo)-2-naphthol], a dimethyl analog of Orange II [1-(2',6'-dimethyl-4'-sulfo-phenylazo)- 2-naphthol], and 4-(4'-sulfonamidophenylazo)-2,6-dimehtylphenol	<i>P. chrysosporium</i>	Oxidation <sup>@</sup>	LiP	Chivukula et al., 1995
Orange II, Tropaeolin O, Congo red and Azure B Orange II	<i>P. chrysosporium</i> BKM-F-1767(ATCC 24725)	Decolorization	LN/MnP	Mielgo et al. 2001
Orange G (azo dye)	<i>P. chrysosporium</i> CCBAS 571	Decolorization	LN	Eichlerova' et al. 2006
Amaranth (azo dye) Cu phthalocyanin (phthalocyanine dye) Poly R (polyaromatic dye) Methyl Orange 52, Ethyl Orange, Acid Yellow 9 Acid Orange 12, Orange II, Orange I and	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Decolorization	LN/LiP and MnP	Pasti-grigsby et al. 1992
Crystal violet and triphenylmethane dyes (pararosaniline, Cresol red, bromphenol blue, ethyl violet, malachite green, and brilliant green)	<i>P. chrysosporium</i> BKM-F-1767 <i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Degradation Decolorization	LN(↑),HN (↓) LN/MnP	Bumpus and Brock 1988 Moldes et al. 2003
Polymeric Dyes (Poly B-411, Poly R-481 and Poly Y-606)	<i>P. chrysosporium</i> (ME-446)	Decolorization	LN/LDS	Glenn and Gold 1983
Poly R-478	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725) <i>P. chrysosporium</i> ME-446 <i>P. sordida</i> (2122) <i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725) <i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Decolorization Decolorization Degradation	ME/LiP, MnP and Laccase LN/MnP LN/MnP	Levin et al. 2004 Moldes et al. 2003 Mielgo et al. 2002
Poly R-481	<i>P. chrysosporium</i>	Decolorization	LN/IE	Greene and Gold 1986

RTBG, RRBS, RBBR, AR, Ast. Blue, Ast. Black, CRFN-3R CTH-A, CRH-E3B	<i>P. chrysosporium</i> ME446	Adsorption	SDB and Cont. Sample	Asma et al., 2006
Textile dyes (Reactofix Orange, Reactofix Golden Yellow, Reactofix Blue HE2R, Navilene Black, Sulphur Green, Sulphur Red, Navinon Blue, Vat brown)	<i>P. chrysosporium</i> ATCC 24725	Degradation and Biosorption	LN/LDS	Capalash and Sharme 1992
Xylidine	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725) <i>P. chrysosporium</i> ME-446 <i>P. sordida</i> (2122)	Decolorization	ME/LiP, MnP and Laccase	Levin et al. 2004
Congo red	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725) <i>P. chrysosporium</i> ME-446 <i>P. sordida</i> (2122)	Decolorization	ME/LiP, MnP and Laccase	Levin et al. 2004
Anthraquinone Blue	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725) <i>P. chrysosporium</i> ME-446 <i>P. sordida</i> (2122)	Decolorization	ME/LiP, MnP and Laccase	Levin et al. 2004
Malachite Green	<i>P. sordida</i> (2122)	Decolorization	ME/LiP, MnP and Laccase	Levin et al. 2004
Blue-BF-R	<i>P. chrysosporium</i> CCB478	Decolorization	LN/LDS	dos Santos et al. 2004
Indigo carmine, bromophenol blue, methyl orange	<i>P. chrysosporium</i>	Decolorization	LN/MnP (↑) and LiP (↓)	Couto et al. 2002
Bromophenol blue, Congo red, Methylene blue, Methyl green, Methyl orange, RBBRC, Toluidine blue, Poly R-478, Poly S-119, Poly T-128	<i>P. chrysosporium</i> BKM-F-1767 (ATCC 24725)	Decolorization <sup>@</sup>	LiP	Ollikka et al. 1993
Acid blue 45 Reactive Blue 4 Reactive Blue 19 Reactive Yellow 145 Remazol yellow RR gran Sulfonaphthalein dye	<i>P. chrysosporium</i> <i>P. chrysosporium</i> (ATCC-34541) <i>P. chrysosporium</i> ATCC 24725  <i>P. chrysosporium</i> <i>P. chrysosporium</i>	Decolorization Bisorption Decolorization  Decolorization Decolorization <sup>@</sup>	LN and Cont. Sample LN and Cont. Sample LN/LiP  LN and Cont. Sample MnP	Zhou and Wen 2009 Bayramoglu et al. 2006 Minussi et al. 2001  Demir et al. 2007 Christian et al. 2003
Porocion brilliant blue HGR, Ranocid fast blue, Acid Red 119, Navidol fast black MSRL	<i>P. chrysosporium</i>	Decolorization <sup>@</sup>	LiP	Verma and Madamwar 2007
Reactive brilliant red K-2BP Diterpenes (Stemodane and stemarane)	<i>P. chrysosporium</i> <i>P. chrysosporium</i> ATCC 24725	Decolorization Transformation	LN and Cont. Sample LN and Cont. Sample	Gao et al. 2006 Lamm et al. 2006



Sulfonated azodyes 3,5-dimethyl-4-hydroxy-azobenzene-4'-sulfonic acid 3-methoxy-4-hydroxyazobenzene-4'-sulfonamide	<i>P. chrysosporium</i> BKM 1767 (ATCC 55184)	Degradation	LN/LiP and MnP	Goszczyński et al. 1994
Direct Blu 71 (DrBu), Direct Red 80 (DrR 80), Polyazo 542, Direct Yellow 106 (DrY 106), Reactive Blue 222 (RBU 222), Reactive Red 195 (RR 195), Reactive Yellow 145 (RY 145), Reactive Black 5 (RBk 5), Acid Blue 62(Abu 62), Acid Yellow 49 (AY 49), Acid Red 266 (AR 266)	<i>P. chrysosporium</i> Burdsall M1 (DSM 13583)	Decolorization	LN and Cont. Sample	Faraco et al. 2009
Cibacron yellow C-2R, Cibacron red C-2G, Cibacron blue C-R, Remazol black B and Remazol red RB	<i>P. chrysosporium</i>	Decolorization	LN/LiP	Robinson et al. 2001
Crocein orange G (COG)	<i>P. chrysosporium</i>	Decolorization <sup>@</sup>	LiPs (H8, H6 and H2)	Ollikka et al. 1998
Azo dyes (with different aminobenzoic and aminosulphonic acids as diazo components, synthetic)	<i>P. chrysosporium</i> Burdsall (ATCC 24725)	Decolorization	LN	Adosinda et al. 2001
Fluorescein acid dyes (Rose Bengal (tetrachloro-tetraiodo-fluorescein))	<i>P. chrysosporium</i> ATCC 24725	Decolorization and Biosorption	LN/LiP	Gonga et al. 1992
Methylene blue	<i>P. chrysosporium</i> (ATCC 34541) <i>P. chrysosporium</i>	Decolorization Decolorization <sup>@</sup>	LN/LiP LiP	Kling and Neto 1991 Alam et al. 2009
Red HE-8B, Malachite green, Navy Blue HE-2R, Magenta and Crystal violet	<i>P. chrysosporium</i>	Decolorization	LN and Con. Sample	Sani et al. 1998
Crystal violet, Methylene blue (MB) and Azure B (AB)	<i>P. chrysosporium</i>	Demethylation <sup>@</sup>	LiP	Ferreira et al. 2000
<b>V. Pharmaceuticals</b> Ibuprofen (IBU)	<i>P. chrysosporium</i> ME-446 (ATCC 34541)	Degradation	LN/P450	Marco-Urrea et al. 2009
<b>VI. Steroids and endocrine disruptors</b> Dehydroepiandrosterone, testosterone, pregnenolone, Progesterone, cortisone, prednisone, estrone Estrone (E1)	<i>P. chrysosporium</i> ATCC 24725 <i>P. sordida</i> YK-624 (ATCC 90872)	Transformation Degradation	6 $\beta$ /14 $\alpha$ -hydroxylase (P450) ME/MnP and Laccase	Lamm et al. 2007 Tamagawa et al. 2006
4-nonylphenol, 17 $\alpha$ -ethinylestradiol and triclosan Phanerochaete magnoliae CCBAS134/I Nonylphenol Estrogen	<i>P. chrysosporium</i> ME 446 <i>P. chrysosporium</i> DSM 1556 <i>P. chrysosporium</i>	Degradation Degradation Oxidation <sup>@</sup>	ME/LiP and MnP!!! LN and Cont. Sample LiP	Cajthaml et al. 2009 Soares et al. 2005 Mao et al. 2009

## VII. Metals

Mercury	<i>P. chrysosporium</i> BKM-F1767 (ATCC 24725)	Bio-accumulation	HN/Cont. Sample	Dhawale et al. 1996
Cadmium (Cd(II))	<i>P. chrysosporium</i> (ATTC 24725)	Biosorption	LN/Cont. Sample	Iqbal et al. 2007
Cyanide	<i>P. chrysosporium</i> (BKM F-1767)	Degradation	LN	Shah et al. 1991
Zinc (ZN (II))	<i>P. chrysosporium</i> (ATCC 23328)	Biosorption	LN and Cont. Sample	Lai et al. 2008
Triphenylarsine (TP)	<i>P. chrysosporium</i>	Oxidation	ME	Hofmann et al. 2001
Phenylarsineoxide (PAO)				
Copper (II) and cadmium (II)	<i>P. chrysosporium</i> ATCC 24725	Biosorption	NL and Cont. Sample	Pakshirajan and Swaminathan
2009				
Cadmium(II), lead(II) and copper(II)	<i>P. chrysosporium</i> ME-446 strain (ATCC-34541)	Biosorption	LN and Cont. Sample	Say et al. 2001
Lead (Pb)	<i>P. chrysosporium</i> BKM-F-1767	Biosorption	PDA and Cont. Sample	Huang et al. 2008
	<i>P. chrysosporium</i>	Biosorption	Cont. Sample	Wu et al. 1999

## VIII. Polymers

Acrylic polymers	<i>P. chrysosporium</i> Burdsall, ATCC 34541	Degradation	LN	Mai et al. 2004
Styrene monomers	<i>P. chrysosporium</i> KFRI 20742	Degradation	ME/LDS?	Lee et al. 2006
Lignopolystyrene graft copolymers	<i>P. chrysosporium</i> Burdsall	Degradation	LN/LiP, MnP and Laccase	Milstein et al. 1992
Polyethylene	<i>P. chrysosporium</i> (ME 446)	Degradation	LN/LiP, MnP and Laccase	Lee et al. 1991
Phenolic resin (pheon-formaldehyde polymer)	<i>P. chrysosporium</i> (strains BKM-F-1767 and ME-446)	Degradation	ME	Gusse et al. 2006
Polyacrylate polymers	<i>P. chrysosporium</i>	Mineralization	HN/CDH	Cameron et al. 2000
	<i>P. chrysosporium</i>	Mineralization	LN	Stahl et al. 2000
	<i>P. chrysosporium</i>	Degradation	LN/MnP	Michel et al. 1991
Bleach plant effluent	<i>P. chrysosporium</i>	Degradation	LN	Potentini and Rodríguez-Malaver 2006
Vinasse	<i>P. chrysosporium</i>	Decolorization	Cont. sample(soy beanandtomoto)	Sampedro et al. 2004
Dry olive residue (DOR) (monomeric phenols)	<i>P. chrysosporium</i>	Degradation	Waste water	Lu et al. 2009
Cooking waste water (Phenolic compounds)	<i>P. chrysosporium</i>	Decolorization	LN/LiP(↑) and MnP(↓)	Mebirouk et al. 2006
Olive Mill Waste (OMW)-Polyphenols	<i>P. flavido-alba</i> FPL 106507	Decolorization	LN/MnP and Laccase	Blañquez et al. 2002
OMW	<i>P. chrysosporium</i> HD	Decolorization	LN/LiP	Sayadi and Ellouz 1995
OMW	<i>P. chrysosporium</i>	Decolorization	LN/LiP, MnP and Laccase	Perez et al. 1987

## Symbols:

<sup>1</sup>, mineralization of PCBs was observed in a mixture consisting of dichloro- through hexachloro- biphenyls

+, Bushan et al (2003) showed biotransformation of RDX by rabbit liver P450 2B4

@, *in vitro* oxidation using purified enzymes from the respective strain

!, involvement of P450s was confirmed by transformation of the respective organophosphorus pesticides by microsomal fractions prepared from *Pleurotus ostreatus* 7989, a white rot fungus. Ibuprofen (IBU) degradation by P450 was confirmed using the cytochrome P450 inhibitors 1-aminobenzotriazole and piperonyl butoxide using the white rot fungus *Trametes versicolor* (Marco-Urrea et al., 2009)

<sup>^</sup>, *P. chrysosporium* was grown on a middle fraction (MF) of diesel fuel at neutral pH in a mineral medium under non-ligninolytic conditions and the ratio of *n*-C17 to pristane was quantified and used as the indicator of MF biodegradation (*n*-alkanes) in these experiments

<sup>#</sup>, mineralization of polycyclic aromatic hydrocarbons (PAHs) was observed in non-aqueous phase liquid (NAPL) mixture.

<sup>\$</sup>, 2,4-D and 2,4,5-T were simultaneously mineralized when presented as a mixture, and mutual inhibition of degradation was not observed (Yadav and Reddy, 1993). In contrast, a relatively higher rate of mineralization of 2,4-D and 2,4,5-T was observed when these compounds were tested as mixtures than when they were tested alone.

<sup>%</sup>, W medium suitable for lignin degradation was used

and <sup>,</sup> a large number of phenolic compounds were found to be degraded by *P. chrysosporium*. Further information can be obtained from Lu et al., 2009

<sup>!!!</sup>, negligible LiP and MnP activities were reported, hence the involvement of these enzymes was considered uncertain.

↓, low activity; ↑, high activity, ↑↑, very high activity

### Abbreviations:

AR, Astrazone Red FBL; Ast. Black, Astrazone Black FDL; Ast. Blue, Astrazone Blue FGRL; CDH, Cellobiose dehydrogenases. CTH-A, Cibacron Turquoise H-A; CRFN-3R, Cibacron Red FN-3R; CRH-E3B, Cibacron Red H-E3B; ECE, Extracellular enzymes; EH, Epoxide hydrolase; GLOX, Glyoxal oxidase; GSH, Glutathione reductase; GMY, Glucose-malt-yeast extract medium; HN, Defined high-nitrogen medium; IE, Intracellular enzymes (cell free extract); LDS, Lignin degrading enzyme system; LiP, Lignin peroxidase(s); LN, Defined low-nitrogen medium; MMN, Melin Norkarns medium (containing malt extract); MnP, Manganese-dependent peroxidase(s); MnP-LPS, MnP-mediated lipid peroxidation system; NGM, Nutrient growth medium; NL, Non-ligninolytic culture conditions such as growth in nutrient-rich media; Non-LDS, Non-involvement of LDS system; OMW, Olive mill wastewaters; PDB/PDA, Potato dextrose broth/agar; SB, Sugarcane bagasse; SDB, Sabouraud dextrose broth; RBBR, Remazol Brilliant Blue R; RRBS, Remazol Red BS; RTBG, Remazol Turquoise Blue G; Cont., (soil or sample) Contaminated with pollutants.

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