Supplementary Table 1. Expamples of microbial delignification of different raw materials

Microorganism	Raw Material	Lignin loss	Improve Hydrolysis[a]	Improve Ethanol Production[a]	Remarks	Reference
C. subvermispora, D. squalens, P. ostreatus and *T. versicolor*	Beech wood chips	13-21%	n.r.	High with *C. subvermispora*	Saved 15% of the electricity needed for the subsequent ethanolysis	Itoh *et al.*, 2003
C. lacerata, *S. hirsutum* and *P. brumalis*	Japanese red pine chips	11-15%	Low-Medium	n.r.		Lee *et al.*, 2007
C. subvermispora and *G. australe*	Wood chips from Monterey pine and silver wattle	9%	High (Monterey pine) No (silver wattle)	Low-Medium in SHF. Very high (Montery pine) and Low (silver wattle) in SSF		Muñoz *et al.*, 2007
P. chrysosporium, *P. cinnabarinus*, RCK-1 and RCK-3	Wheat straw and mesquite	8-23%	Medium	Medium (wheat straw) and Low (mesquite)	Lower acid load for hydrolysis	Kuhar *et al.*, 2008
Bacterial and fungal strains	Sugarcane trash	33-92%	n.r.	n.r.	Cellulase production	Singh *et al.*, 2008
T. versicolor	Wheat straw and steam exploded wheat straw	31-75%	n.r.	n.r.	Better delignification in steam-exploded material	Zhang *et al.*, 2008
P. chrysosporium	Cotton stalks	19-36%	No	No		Shi *et al.*, 2009
Euc-1 and *I. lacteus*	Wheat straw	n.r.	Medium-High	n.r.	Increase cellulose/lignin ratio	Dias *et al.*, 2010
C. subvermispora	Corn stover	Up to 32%	High-Very high	Very high	Minimal cellulose loss	Wan and Li, 2010

I. lacteus	Cornstalks	75-80%	Low-Medium	n.r.		Yu *et al.*, 2010
T. versicolor (strain deficient on CDH)	Chinese kenaf pulp pretreated with soda-anthraquinone cooking	n.r.	High-Very high	n.r.		Canam *et al.*, 2011
P. cinnabarinus	Mesquite and Spanish flag	6-12%	Medium	n.r.	Reduced phenolic content in acid hydrolysate	Gupta *et al.*, 2011
Different white-rot fungi	Wheat straw	Up to 47%	Low-Very high	Low-Very high		Salvachúa *et al.*, 2011
P. chrysosporium	Wheat straw	30%	n.r.	n.r.		Singh *et al.*, 2011

n.r. not reported

[a] Low, increments lower than 20%; Medium, increments between 20-50%; High, increments between 50-90%; Very high, increments higher than 90%

Supplementary Table 2. *In situ* microbial detoxification by co-culture, evolutionary engineering, genetic engineering and other strategies

Strategy	Strain	Raw Material	Improve fermentation parameters[a]			Increase Tolerance			Remarks	Reference
			Ethanol Concentration	Yield	Productivity	Weak acids	Furan derivatives	Phenolic compounds		
Co-culture	*A. nidulans* FLZ10	Steam exploded corn stover	Very high	Very high	Very high	Yes	Yes	n.r.	Little competition with *S. cerevisiae*	Yu *et al.*, 2011
Adaptation	Adapted *P. stipitis* NRRL Y-7124 and *S. cerevisiae* NRRL Y-12632	Synthetic media	No	No	Very high	No	Yes	No		Liu *et al.*, 2005
	Adapted xylose-utilizing *S. cerevisiae*	Hydrolysate from acid pretreated sugarcane bagasse	Low	No	Very high	No	Yes	No		Martín *et al.*, 2007
	Adapted *S. cerevisiae* Y5	SPORL-pretreated lodgepole pine	No	No	Very high	No	Yes	No		Tian *et al.*, 2010
	Adapted *S. cerevisiae* F12	Steam exploded wheat straw	Medium-High	Low-Medium	Low-Very high	Yes	Yes	Yes	Less residual xylose	Tomás-Pejó *et al.*, 2010
	Adapted *P. stipitis* Y-7124	Hydrolysate from acid pretreated sugar maple	Very high	Very high	Very high	Yes	Yes	Yes		Stoutenburg *et al.*, 2011
	Adapted *P. stipitis*	Steam exploded	Very high	Very	Very High	Yes	Yes	Yes		Yang *et al.*,

	CBS6054	corn stalk		High						2011
	Adapted xylose-recombinant *S. cerevisiae* strains	Hydrolysate from dilute-acid pretreated spruce	Low	Low	Medium	Yes	Yes	Yes		Koppram *et al.*, 2012
Genetic Engineering	*S. cerevisiae* INVSC1 (strain overexpressing PAD1)	Synthetic media and hydrolysate from dilute-acid pretreated spruce	n.r.	Low-Medium	Low	No	No	Yes		Larsson *et al.*, 2001a
	S. cerevisiae INVSC1 (strain expressing laccase (*T. versicolor*) and overexpressing SSO2)	Synthetic media and hydrolysate from dilute-acid pretreated spruce	Very high	Very high	Very high	No	No	Yes		Larsson *et al.*, 2001b
	S. cerevisiae BY4741 (strain overexpressing ZWF1)	Synthetic media	n.r.	n.r	n.r.	No	Yes	No		Gorsich *et al.*, 2006
	S. cerevisiae CEN.PK 113-5D (strain overexpressing ADH6)	Synthetic media	n.r.	n.r.	n.r.	No	Yes	No	Higher rate even in aerobic and anaerobic conditions	Petersson *et al.*, 2006
	S. cerevisiae CEN.PK 113-5D (strain	Hydrolysate from dilute-acid	No	No	Medium	No	Yes	No		Almeida *et al.*, 2008

	overexpressing ADH6)	pretreated spruce								
Others	Continuous culture with cell recirculation (*S. cerevisiae* ATCC 96581)	Hydrolysate from dilute-acid pretreated spruce	Low	Low	Low	No	Yes	n.r.		Brandberg *et al.*, 2005
	Continuous culture with encapsulated cells (*S. cerevisiae* CBS 8066)	Hydrolysate from dilute-acid pretreated spruce	n.r.	Medium	Medium-Very high	No	Yes	n.r.	Keep more than 75% cell viability	Talebnia and Taherzadeh, 2006
	Anaerobic batch cultivations of encapsulated cells (*S. cerevisiae* CBS 8066)	Hydrolysate from dilute-acid pretreated spruce	n.r.	Low	Low	No	Yes	n.r.		Westman *et al.*, 2012
	Continuous culture with flocculating yeast (*S. cerevisiae* CCUG 53310)	Hydrolysate from dilute-acid pretreated spruce	Very high*	Very high*	Very high*	No	Yes	n.r.		Purwadi *et al.*, 2007

[a] Low, increments lower than 20%; Medium, increments between 20-50%; High, increments between 50-90%; Very high, increments higher than 90%.
n.r. not reported
* Taking into account the dilution rate

Supplementary References

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