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Data Article

Secretome data from *Trichoderma reesei* and *Aspergillus niger* cultivated in submerged and sequential fermentation methods



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ABSTRACT

The cultivation procedure and the fungal strain applied for enzyme production may influence levels and profile of the proteins produced. The proteomic analysis data presented here provide critical information to compare proteins secreted by *Trichoderma reesei* and *Aspergillus niger* when cultivated through submerged and sequential fermentation processes, using steam-explosion sugarcane bagasse as inducer for enzyme production. The proteins were organized according to the families described in CAZy database as cellulases, hemicellulases, proteases/peptidases, cell-wall-protein, lipases, others (catalase, esterase, etc.), glycoside hydrolases families, predicted and hypothetica proteins. Further detailed analysis of this data is provided in "Secretome analysis of *Trichoderma reesei* and *Aspergillus niger* cultivated by submerged and sequential fermentation process: enzyme production for sugarcane bagasse hydrolysis" C. Florencio, F.M. Cunha, A.C Badino, C.S. Farinas, E. Ximenes, M.R. Ladisch (2016) [1].

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Subject area	Biochemistry
ject area	Proteomic
Type of data	Table
How data was acquired	LC MS/MS analysis using Mascot Daemon version 2.4.0 (Matrix Science)
Data format	Analyzed
Experimental factors	Concentrated enzymatic cocktail from <i>A. niger</i> A12 and <i>T. reesei</i> Rut C30 produced by submerged fermentation and sequential fermentation
Experimental	Peptides from enzyme cocktail of A. niger A12 and T. reesei Rut C30 were
features	analyzed by LC-MS/MS
Data source location	Purdue University, West Lafayette, USA.
Data accessibility	Data is with this article

Specifications Table

Value of the data

This data set will be of value to the scientific community aiming to analyze the identified proteins secreted by *T. reesei* and *A. niger* under different cultivation methods.

The data can be a useful tool to effectively select fungal strain and cultivation procedure for the production of proteins of interest.

The data provided here identify key enzymes from *T. reesei* and *A. niger* for combined use to effectively degrade lignocellulose substrates, and therefore provide an opportunity to help researchers in the field to formulate enzyme cocktails in according to characteristics of lignocellulose biomass and enzyme activities found in the secretome.

1. Data

In Table 1, the proteins identified by proteomic analysis of enzymatic cocktails from *Trichoderma reesei* and *Aspergillus niger*, cultivated on pretreated sugarcane bagasse by either submerged or sequential fermentation processes, are presented according to the families classification from CAZy database.

The enzymatic hydrolysis of pretreated sugarcane bagasse was performed with combined extracts from *T. reesei* Rut C30 and *A. niger* A12, and the data of proteomic analysis of this combination of identified proteins is shown in Table 2. The indicated enzyme loadings were applied for steam-explosion sugarcane bagasse saccharification as described by Florencio et al. [1].

2. Experimental design, materials and methods

2.1. Fungal strains

The strains used for enzyme production were *T. reesei* Rut-C30 and *A. niger* wild type A12 obtained from Centre for Agricultural Bioscience International (CABI) culture collection (United Kingdom) and Embrapa Food Technology collection (Rio de Janeiro, Brazil), respectively. The conditions in which strains were maintained are described in Florencio et al. [1].

2.2. Cultivation conditions

Submerged and sequential fermentations carried out to obtain the enzymatic cocktails from *T. reesei* and *A. niger* are described in detail in Florencio et al. [1]. Briefly, the submerged fermentation was initiated with a 48 h pre-culture that contained a final conidia concentration of 10⁷ spores/mL in

Table 1

Major proteins identified in the secretome of *Trichoderma reesei* and *Aspergillus niger* cultivated under submerged (A) and sequential (B) fermentation methods.

Gene ID	Enzyme		Family	T. re	esei	A. n	iger
				A	В	A	В
21842121	Cellulases	Endoglucanase	GH12	х	x		
3757552		Endoglucanase A	GH12			х	х
145235569		Endo-beta-1,4-glucanase A	GH12				х
145228915		Endo-beta-1,4-glucanase A	GH12				х
2833231		Endoglucanase I	GH7	х	х		
121794		Endoglucanase II	GH5	х			
201066457		Endoglucanase IV (AA9)	GH61	х	х		
145235523		Glucan endo-1,3-beta-glucosidase eglC	-			х	х
320592482		Beta-glucanase	-	х			
403314396		Endoglucanase VI	GH61	х			
145229151		Endo-1,3(4)-beta-glucanase	GH16			х	х
202072834		Cellobiohydrolase I	GH7	х	х		
95115828		Cellobiohydrolase II	GH6	х	х		
74698499		1,4-beta-D-glucan cellobiohydrolase	GH7			х	х
201066459		Glucosidase	GH3	х			
126046487		β-glucosidase	GH3			х	х
145242946		β-glucosidase M 4	GH3				х
145255120		Glucan 1,3-beta-glucosidase A	GH5			х	х
400602153		Glucan 1,3-β-glucosidase	GH17	х			
257187		Alpha-glucosidase P2 subunit 5	GH31				х
317035725	Hemicellulases	Endo-arabinase	GH43				х
145234699		Alpha-L-arabinofuranosidase axhA	GH62			х	х
358375978		Arabinoxylan arabinofuranohydrolase	GH62			х	х
145233623		Endo-1,5-alpha-L-arabinosidase C	GH43			х	х
145250511		Alpha-N-arabinofuranosidase B	-			х	х
78101601		Anfaea-ferulic Acid Complex	-			х	
23821545		Feruloyl esterase B	-			х	
145246174		Feruloyl esterase C	-			х	х
48425840		Ferulic acid esterase	-				х
145247672		Feruloyl esterase B-1	-				х
145230716		Beta-galactosidase E	GH35			х	х
350630290		Alpha-galactosidase extracellular	-				х
74626383		Alpha-galactosidase B	-			х	х
317034650		Alpha-galactosidase D	-				х
307776646		Beta-mannanase	GH5	х	х		
358367813		Alpha-mannosidase	GH38			х	
145233855		Alpha-mannosidase	GH38			х	
572273984		Beta-mannosidase A	GH2	х			
572273001		Putative beta-mannosidase A	GH2	х	х		
317032967		Beta-mannosidase A	GH2			х	Х
358369379		Beta-mannosidase (MndA)	GH2				х
145230794		Alpha-1,2-mannosidase 1B	GH47			х	х
145256261		Pectate lyase plyB	-			х	
572278177		Pectin lyase-like protein	_	х	x		
165906534		Endoxylanase	GH10	х	х		
11513450		Acetyl Xylan Esterase	-	х	х		
292495278		Endo-1,4-beta-xylanase C	GH10			х	х
549461	Hemicellulases	Endo-1,4-beta-xylanase 2	GH11	х	х		
145250044		Endo-1,4-beta-xylanase 5	GH11			х	х
157488002		Swollenin	CBM1	х	х		
9858848		Xylanase	GH11			х	
42716406		Xylanase	GH11	х	х		
13242071		Xylanase	GH11				х
26514830		Xylanase	GH11		х		
83638302		Xylanase	GH11				х
380293098		Xylanase II	GH11	х	х		

Table 1 (continued)

Gene ID	Enzyme		Family T. reesei		esei	esei A. niger	
				A	В	A	В
145242002		Alpha-xylosidase	GH31			x	х
145230215		Exo-1,4-beta-xylosidase xlnD	GH3			х	х
145243586		Xylosidase/arabinosidase	-			х	х
145228611	Protesses/ Pentidases	Aorsin					v
530795	Toteases/Teptidases	Pensingen	_			x	x
589101183		Aminopentidase	_	x		~	A
145257498		Aminopeptidase 2	-			х	
145242728		Vaculolar aspartyl aminopeptidase Lap4	-			х	х
145583569		Aspartic endopeptidase	-	х			
145254317		Aspartic-type endopeptidase opsB	-				х
145248205		Aspartic-type endopeptidase opsB	-				х
145256471		Dipeptidyl peptidase III	-			х	
145249068		Tripeptidyl-peptidase sed2	-				х
629687989		Extracellular corine carbourportidace	-	х			
145246822		Ser carboyypeptidase	-			x	v
145235505		Serine carboxypeptidase	_			x	x
317026828		Serine-type carboxypeptidase	_			x	x
134077081		Endoprotease Endo-Pro-A. niger	-			x	x
62002221		Subtilase protease	-		х		
115111226		Subtilisin-like protease	-	х	х		
589111601		Serine protease	-		х		
29421423		Extracellular serine protease	-	х			
124295071		SprT - serine protease	-	х	х		
464359		Subtilisin-like serine protease pepC	-			х	
589099267		Irypsin-like serine protease	-	х	x		
193/35605		Vacuolar proteinase	-	v	x		
36///2601		Aspartic proteinase	-	х	х		
38256986	Cell-wall protein	Cell wall protein	-			х	
47028077		Cell-wall protein - CwpA	-				х
145252266		GPI anchored cell wall protein	GH64			х	х
589109601		Alkaling poplycocomal coramidade	-		х		
387772865			_	v	v	x	
270160616		Chitinase	- CH18	x	x		
145232927		Endochitinase 1	GH18			х	х
1839391		Exochitinase	GH20	х			
145256696		Protein ecm33	-			х	х
145241502	Lipacos	Lucophospholipaco 1					v
1452341552	Lipases	Lysophospholipase 1	_				x v
145231236		Phospholipase C PLC-C	_				x
109677003		Triacylglycerol lipase precursor	-				x
110431975		Triacyglycerol lipase B	-				х
E9011471E	Others	Amidaça					
1/52201/2	Others	Aminutransferase class V	_	х	X	v	
145241960		Alpha-amylase	_			x	
350631148		Alpha-amylase A	CBM20			~	x
145243632		Alpha-amylase a type-1/2	-			x	x
224027		Glucoamylase G1	GH15			х	x
145241784		N-acetylglucosaminidase	GH20			х	
113206519		Acetyl esterase	-		х		
589098125		Carbohydrate esterase	-	х	х		
358388255		Carbohydrate esterase family 15 protein	CBM15	х	х		
572279065		Carboxylesterase	-		х		
145233451		Cholinesterase	-			х	x
1/03040 580115621		Catalase K Catalase/perovidase	_	v			х
505115021		catalase/perovidase		Λ			

Table 1 (continued)

ABAB145228625Catalase R-×1191/74019Mycelai catalase Cat1-×04312830Cellulose Induced Protein, CIP1-×185201Oxalate descarboxylase family bicupin-×185201Oxalate descarboxylase family bicupin-×185201Atdehyde delydrogenase-××185201Atdehyde delydrogenase-××185201Malate delydrogenase-××18520179PRAD/MArcontaining delydrogenase-××18702487Malate delydrogenase-××142527405Short-chan delydrogenase-××142526101.3-beta-glucanosyltransferase gel1GH72××142526101.3-beta-glucanosyltransferase gel2GH72××14252603Nucleoside diphosphate kinase-××1432260491.3-beta-glucanosyltransferase gel2GH72××14322605Aud phosphate-like protein-×××14322602Phosphatidygerate mutase family protein-×××14322602Phosphatidygerate (J1)GH××××14322602Chamily 2 proteinGH2××××19724Phosphatidygerate (J1)GH××××19725519Phosphatidygerate (G11)GH××××	Gene ID	Enzyme		Family	T. re	eesei	A. 1	iger
145228625 Catalase R - x 119474019 Mycelai catalase Cat1 - x x 94312830 Cellulose Induced Protein, CIP1 - x x 981017171 Oxalate decarboxylase - x x 1195291 Aldehyde dehydrogenase - x x 1195291 Aldehyde dehydrogenase - x x 150201707 PAD/FMN-containing dehydrogenase - x x 145236405 Short-chain dehydrogenase - x x 145236405 Short-chain dehydrogenase - x x 145236401 1,3-beta-glucanosyltransferase gel1 GH72 x x 14524400 1,3-beta-glucanosyltransferase gel2 GH72 x x 145242500 Inulinase Catalase CatA - x x 14522655 Acid phosphates-like protein - x x x 14522650 Acid phosphatese-like protein - x x x 14522655 Acid phosphatese-like protein - </th <th></th> <th></th> <th></th> <th></th> <th>A</th> <th>В</th> <th>A</th> <th>В</th>					A	В	A	В
1194/2019Myccial atalase Carlxxx	145228625		Catalase R	-			х	
404312830 Cellulose Induced Protein, CIP1 - x x x 380482042 Oxalate decarboxylase family bicupin - x x x 380482042 Oxalate decarboxylase family bicupin - x x x 572279542 Dihydrologenase - x	119474019		Mycelial catalase Cat1	-			х	
S8048294 Oxalate decarboxylase mill bicpin - x x 1169291 Adebyde dehydrogenase - x x 250631709 Phydrolbyod dehydrogenase - x x x 250631709 Phydrolbyod dehydrogenase - x x x 2506170 Malate dehydrogenase - x x x x 142524047 Malate dehydrogenase - x <td>404312830</td> <td></td> <td>Cellulose Induced Protein, CIP1</td> <td>-</td> <td>х</td> <td>х</td> <td></td> <td></td>	404312830		Cellulose Induced Protein, CIP1	-	х	х		
380482942 Oxalate decarbox/Jase family bicupin - x x 1169291 Dihydrohydrogenase - x x x 530631179 FAD/FMN-containing dehydrogenase - x x x 19702487 Malate dehydrogenase - x x x x x x 19702487 Malate dehydrogenase - x <	589107171		Oxalate decarboxylase	-	х	х		
1105291 Aldehydr dehydrogenase - × <td< td=""><td>380482942</td><td></td><td>Oxalate decarboxylase family bicupin</td><td>-</td><td>х</td><td></td><td></td><td></td></td<>	380482942		Oxalate decarboxylase family bicupin	-	х			
572279542 Dihydrolipoyi dehydrogenase - x x x 530631179 Malate dehydrogenase - x x x 145257405 Short-chain dehydrogenase - x x x 145257405 Short-chain dehydrogenase - x x x x 14525610 1.3-beta-glucanosyltransferase gel1 CH72 x x x 145244007 1.3-beta-glucanosyltransferase gel2 CH72 x x x 145244200 Glutaminase GtaA - x x x x 14524250 Nucleoside diphosphate kinase - x x x x 14524250 Nucleoside diphosphate segl3 CH73 x x x 14524250 Nucleoside diphosphate segl3 CH73 x x x 14524250 Nucleoside diphosphate segl3 CH x x x x 14524250 Nucleoside diphosphate segl3 CH x x x x x 145242650 Chyoside Hydrolase f	1169291		Aldehyde dehydrogenase	-			х	
350811379 FAD/FMN-containing dehydrogenase - × × 19702487 Malate dehydrogenase - × × × 145257405 Short-chain dehydrogenase - × × × × 145256130 1.3-beta-glucanosyltransferase gel1 CH72 × <	572279542		Dihydrolipoyl dehydrogenase	-	х	х		
S80113573Malate dehydrogenase-xx145257405Short-chain dehydrogenase-xxx145257405Short-chain dehydrogenase-xxx145250419Glycosidase crf1-xxx1452640071.3-beta-glucanosyltransferase gel1CH72xxx14524420601.3-beta-glucanosyltransferase gel2CH72xxxx1452424270Clutarninase CtaA-xxxxx145242650Nucleoside diphosphate kinase-xxxxx145224200Nucleoside diphosphate kinase-xxxxx14522500Phosphate-repressible acid phosphate-xx <td>350631179</td> <td></td> <td>FAD/FMN-containing dehydrogenase</td> <td>-</td> <td></td> <td></td> <td>х</td> <td></td>	350631179		FAD/FMN-containing dehydrogenase	-			х	
19702487Malate delydrogenase××× <td>589113573</td> <td></td> <td>Malate dehydrogenase</td> <td>-</td> <td>х</td> <td></td> <td></td> <td></td>	589113573		Malate dehydrogenase	-	х			
145237405 Short-chain dehydrogenase - × × × 145236130 1.3-beta-glucanosyltransferase gel1 GH72 × × × 145244007 1.3-beta-glucanosyltransferase gel2 GH72 × × × 145244270 Glutarninase GtaA - ×	19702487		Malate dehydrogenase			х		
145250 1.3-beta-glucanosyltransferase gel2 GH72 × x 14526130 1.3-beta-glucanosyltransferase gel2 GH72 × x x 145241490 1.3-beta-glucanosyltransferase gel2 GH72 × x x 145247260 Inulinase × x x x 145247260 Inulinase × x x x 145247260 Inulinase × x x x 145251519 Phosphate-repressible acid phosphatase × x x 14525251519 Phosphate-repressible acid phosphatase × x x 572275960 Glycoside Hydrolases families GHy partial protein GH2 x x x 589104105 GH family 12 protein GH2 x x x x x 58911151 GH family 15 protein (glucoamylase) GH15 x x x x x x 58910075 GH family 18 protein (glucoamylase) GH18 x x x <	145257405		Short-chain dehydrogenase	-			х	х
145254130 1.3-beta-glucanosyltransferase gel1 GH72 × x x 145244490 1,3-beta-glucanosyltransferase gel3 GH72 × x x 145244270 Glutarninase GtAA - × x x 14524250 Nucleoside diphosphatase-like protein - × x x 145242650 Nucleoside diphosphatase-like protein - × x x 145242650 Nucleoside diphosphatase-like protein - × x x 145223002 Phosphatylcylcerate mutase family protein - × x x 14525159 Glycoside Hydrolases familis Glycoside Hydrolase (GH) GH x x x 572278887 Glycoside Hydrolase (GH) GH x x x x x 5839100793 GH family 12 protein GH2 x x x x x x 589104079 GH family 15 protein (glucoamylase) GH15 x x x x x x 58911432 GH family 15 protein (glucoamylas	145230419		Glycosidase crf1	-				х
14524490 1.3-beta-glucanosyltransferase gel2 GH72 × × × 14524490 Glutaminase GtaA - ×	145256130		1,3-beta-glucanosyltransferase gel1	GH72			х	х
145234490 1.3-beta-glucanosyltransferase gel3 × × × 14524270 Glutaminase GtaA × × × 145242650 Nucleoside diphosphate kinase × × × 145242650 Nucleoside diphosphatese-like protein × × × 130734 Phosphatidylgbycerol × × × × 145232002 Phosphoglycerate mutase family protein × × × × × × 145235159 Glycoside Hydrolase (GH) GH ×	145240407		1,3-beta-glucanosyltransferase gel2	GH72			х	х
14524720 Glutaminase GtAA - x x x 145247260 Inulinase GH32 x x 145247260 Nucleoside diphosphate kinase - x x x 589102565 Acid phosphate-repressible acid phosphatase - x x x 145232002 Phosphatidylgycerol - x x x 145251519 Phosphate fergite acid phosphatase - x x x 572278560 Glycoside Hydrolases familie Glycoside Hydrolase (GH) CH x x x 58910015 GH family 2 protein CH3 x x x x 589100793 GH family 10 CH10 x x x x x 5891133 GH family 16 protein GH17 x x x x x 58911453 GH family 16 GH4 x x x x x 58911453 GH family 18 CH12 x x x x x 58911629 GH family 18 <td>145241490</td> <td></td> <td>1,3-beta-glucanosyltransferase gel3</td> <td>GH72</td> <td></td> <td></td> <td></td> <td>х</td>	145241490		1,3-beta-glucanosyltransferase gel3	GH72				х
14524260 Inulinase x x 14524260 Nucleoside diphosphate kinase x x 130734 Phosphatase-like protein - x x 1452200 Phosphatidylgycorate mutase family protein - x x 145232002 Phosphoglycerate mutase family protein - x x 572275980 Glycoside Hydrolases familie Glycoside Hydrolase (GH) GH x x x 583104105 GH family 2 protein GH2 x x x x 583104105 GH family 5 protein GH5 x x x x 583104105 GH family 15 protein (glucoamylase) GH15 x x x 589104133 GH family 16 protein (glucoamylase) GH16 x x x 58911433 GH family 16 protein GH18 x x x x 58911461 GH family 18 GH18 x x x x x 58911461 GH family 17 GH17 x x x	145234270		Glutaminase GtaA	-			х	х
145242650 Nucleoside diphosphate kinase - x x 589102565 Acid phosphate-repressible acid phosphates - x x 130734 Phosphate-repressible acid phosphates - x x 14523150 Phosphatidylgycerol - x x x 57227887 Glycoside Hydrolase families Glycoside Hydrolase (GH) GH x x x 572275860 Glycoside Hydrolase families Glycoside Hydrolase (GH) GH x x x 572275860 Glycoside Hydrolase families Glycoside Hydrolase (GH) GH x x x 58310405 CH family 2 protein GH3 x x x x 261825113 GH family 16 GH16 x x x x 589110793 GH family 16 protein GH17 x x x x 589113629 GH family 18 protein GH18 x x x x 589103027 GH family 28 protein GH28 x x x x 589103027 <td>145247260</td> <td></td> <td>Inulinase</td> <td>GH32</td> <td></td> <td></td> <td>х</td> <td>х</td>	145247260		Inulinase	GH32			х	х
Sep102565Acid phosphatase-like protein-xxx130734Phosphatid-repressible acid phosphatasexxx145232002Phosphoglycerate mutase family proteinxxx572275860Glycoside Hydrolases familiesGlycoside Hydrolase (GH)GHx-xx572275960GH family 2 proteinGH2x-xx-588104105GH family 3GH3xxx-589100793GH family 15 proteinGH3xxxx-589100793GH family 16 proteinGH10xxxx	145242650		Nucleoside diphosphate kinase	-			х	
130734 Phosphate-repressible acid phosphatase - x x 145232002 Phosphoglycerate mutase family protein - x x 572278887 Glycoside Hydrolases families Glycoside Hydrolase (GH) GH x x x 572275960 GH GH x x x x x 58381827 GH family 2 GH GH3 x x x x 5891004005 GH family 15 protein GH5 x x x x x 589104105 GH family 15 protein (glucoamylase) GH15 x	589102565		Acid phosphatase-like protein	-	х	х		
145232002 Phosphatidylglycerol - X X 145251519 Phosphoglycerate mutase family protein - X X 572275860 Glycoside Hydrolases families Glycoside Hydrolase (GH) GH X X 58818427 GH family 2 protein GH2 X X X 58810405 GH family 2 protein GH5 X X X 589104105 GH family 10 GH10 X X X 5891040793 GH family 16 GH10 X X X 589113453 GH family 16 GH16 X X X 589113629 GH family 18 GH17 X X X 589113629 GH family 18 GH28 X X X 589103027 GH family 28 protein GH38 X X X 589103027 GH family 43 protein GH47 X X X 589103027 GH family 43 protein GH47 X X X 589103027 GH family 41 protein GH47 X	130734		Phosphate-repressible acid phosphatase	-				х
145251519 Phosphoglycerate mutase family protein - × 572275887 Glycoside Hydrolases families Glycoside Hydrolase (GH) CH × × 572275960 CH family 2 protein CH2 × × × 58381827 CH family 3 CH3 × × × 589100703 CH family 10 CH10 × × × 261825113 CH family 15 protein (glucoamylase) CH16 × × × 58910793 CH family 16 protein CH17 × × × × 58911611 CH family 18 protein (chitinase) CH18 × × × × 589103027 CH family 28 protein CH28 × × × × 589103027 CH family 38 protein CH33 × × × × 589103027 CH family 47 protein CH47 × × × × 589103027 CH family 47 protein CH47 × × × × 589103027 CH family 71 protein CH47 × <td>145232002</td> <td></td> <td>Phosphatidylglycerol</td> <td>-</td> <td></td> <td></td> <td>х</td> <td>х</td>	145232002		Phosphatidylglycerol	-			х	х
572278887 Clycoside Hydrolases families Clycoside Hydrolases (GH) GH x 572275960 GH, partial GH x 58381827 GH family 2 protein GH2 x 589104105 GH family 5 protein GH3 x 58838254 GH family 15 protein (glucoamylase) GH16 x 261825113 GH family 16 protein GH17 x 589113453 GH family 16 protein GH17 x 589113453 GH family 16 protein GH18 x 589113629 GH family 18 GH18 x 589113629 GH family 28 protein GH28 x 589130027 GH family 28 protein GH28 x 589103027 Family 31 CH GH37 x x 589103027 GH family 43 protein GH37 x x 589103027 GH family 43 protein GH37 x x 589103027 GH family 71 protein GH47 x x 589103027 GH family 71	145251519		Phosphoglycerate mutase family protein	-				х
572275960CH, partialCHx358381827CH family 2 proteinGH2x358381827CH family 3GH3x358388254CH family 15 proteinGH5x589100793CH family 15 protein (glucoamylase)GH10xx261825113CH family 16 proteinGH17xx589113453CH family 16 proteinGH17xx589113453CH family 16 proteinGH17xx589113629CH family 17GH18xx589113629CH family 18 proteinGH28xx589108051CH family 28 proteinGH28xx589109851CH family 38 proteinGH3xx58910027CH family 43 proteinGH47xx589103027CH family 44 proteinGH47xx58910379CH family 55GH57xx58910379CH family 71 proteinGH71xx58910379CH family 71 proteinGH71xx58910379CH family 71 proteinGH71xx58910361CH family 71 proteinGH71xx58910363CH family 71 proteinGH71xx58910364CH family 71 proteinGH71xx58910361CH family 71 proteinGH71xx58910361CH family 72 (ignin-degrading)GH74xx58910363CH family 74 proteinCH7	572278887	Glycoside Hydrolases families	Glycoside Hydrolase (GH)	GH	х			
35831827CH family 2 proteinCH2x589104105CH family 3CH3x35838254CH family 15 proteinCH5x261825113CH family 15 protein (glucoamylase)CH15xx261825113CH family 16 proteinCH16xx358382969CH family 16 proteinCH17xx589113619CH family 16 proteinCH17xx589113629CH family 16 proteinCH18xx589113629CH family 18CH18xx589109851CH family 28 proteinCH28xx589103027CH family 38 proteinCH38xx589103027CH family 47 proteinCH47xx589103027CH family 54 (lignin-degrading)CH57xx589103027CH family 47 proteinCH47xx589103027CH family 55CH7xx589103027CH family 71 proteinCH47xx589103027CH family 71 proteinCH47xx5891030379CH family 71 proteinCH47xx58910315CH family 71 proteinCH71xx58910315CH family 71 proteinCH71xx58910315CH family 71 proteinCH71xx5891045CH family 71 proteinCH74xx5891045CH family 71 proteinCH74xx589108435CH fami	572275960		GH, partial	GH		х		
589104105GH family 3GH3x358388254GH family 10GH5x261825113GH family 15 protein (glucoamylase)GH15xx261825113GH family 16 protein (glucoamylase)GH16xx58910793GH family 16 proteinGH17xx589113453GH family 16 proteinGH17xx589113629GH family 17GH17xx589113629GH family 28GH28xx589109851GH family 28 proteinGH28xx589103027GH family 38 proteinGH3xx589103027GH family 41 proteinGH47xx589103027GH family 41 proteinGH47xx58910379GH family 41 proteinGH47xx58910379GH family 17 proteinGH77xx58910379GH family 17 proteinGH77xx58910379GH family 17 proteinGH77xx58910379GH family 71 proteinGH77xx58910379GH family 71 proteinGH71xx58910379GH family 71 proteinGH71xx58910361GH family 71 proteinGH71xx58910361GH family 71 proteinGH74xx58910361GH family 72 (lignin-degrading)GH72xx589108435GH family 74 proteinGH74xx589108087	358381827		GH family 2 protein	GH2	х			
358388254 GH family 5 protein GH5 x 589100793 GH family 10 GH10 x x 261825113 GH family 15 protein (glucoamylase) GH16 x x 589113453 GH family 16 protein GH17 x x 589113453 GH family 16 protein GH17 x x 589113629 GH family 17 GH18 x x x 589109851 GH family 28 GH28 x x x 589109053 GH family 38 protein GH38 x x x 589103027 GH family 48 protein GH3 x x x 589103027 GH family 49 protein GH47 x x x 589103027 GH family 47 protein GH47 x x x 589103027 GH family 71 protein GH47 x x x 589103027 GH family 71 protein GH47 x x x 589103027 GH family 71 protein GH47 x x x 58910315	589104105		GH family 3	GH3		х		
589100793 GH family 10 GH10 x x 261825113 GH family 15 protein (glucoamylase) GH15 x x 35831453 GH family 16 protein GH10 x x 358382969 GH family 16 protein GH17 x x 589111611 GH family 17 GH18 x x 589113629 GH 18 protein (chitinase) GH18 x x 589109851 GH family 28 protein GH28 x x 589103027 GH family 38 protein GH37 x x 589103027 GH family 43 protein GH47 x x 589103027 GH family 47 protein GH47 x x 589103027 GH family 43 protein GH47 x x 589103027 GH family 41 protein GH47 x x 589103027 GH family 42 protein GH47 x x 589103037 GH family 43 protein GH47 x x 58910315 GH family 71 protein GH47 x x 589	358388254		GH family 5 protein	GH5	х			
261825113 GH family 15 protein (glucoamylase) GH 15 x x 589113453 GH family 16 CH16 x x 589113453 GH family 16 protein GH17 x x 58911141 GH family 17 GH17 x x 589113629 GH 18 protein (chitinase) GH18 x x 317028062 GH family 28 GH28 x x x 589109851 GH family 28 protein GH28 x x 572273805 Family 31 GH GH38 x x 58910027 GH family 43 protein GH3 x x 58910105 GH family 47 protein GH47 x x 58910105 GH family 54 GH3mily 47 x x 58910105 GH family 55 GH55 x x 58910379 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 5	589100793		GH family 10	GH10	х	х		
589113453 CH family 16 CH16 x 358382969 CH family 16 protein CH17 x 589111611 CH family 17 CH17 x 589113629 CH 18 protein (chitinase) CH18 x x 589109851 CH family 18 CH28 x x 589109851 CH family 28 protein CH28 x x 572273805 Family 31 CH CH38 x x 589103027 CH family 43 protein CH43 x x 589103027 CH family 47 protein CH47 x x 631371154 CH family 47 protein CH47 x x 631371154 CH family 55 CH57 x x 589100379 CH family 71 protein CH71 x x 58911645 CH family 71 protein CH71 x x 58910131 CH family 71 protein CH71 x x 589103161 CH family 71 protein CH71 x x 58910315 CH family 72 (lignin-degrading) CH72 x<	261825113		GH family 15 protein (glucoamylase)	GH15	х	х		
358382969 CH family 16 protein GH17 x 589111611 CH family 17 GH17 x 589113629 CH 18 protein (chitinase) GH18 x x 317028062 CH, family 18 GH18 x x 589109851 CH family 28 protein GH28 x x 589109851 CH family 38 protein GH3 x x 589100027 CH family 38 protein GH3 x x 58910105 CH family 43 protein GH47 x x 58910105 CH family 54 (lignin-degrading) GH57 x x 58910105 CH family 71 protein GH71 x x 58910105 CH family 55 GH55 x x 58910105 CH family 71 protein GH71 x x 589101645 CH family 71 protein GH71 x x 589101361 CH family 71 protein GH71 x x 589103161 CH family 71 protein GH71 x x 589103161 CH family 74 protein	589113453		GH family 16	GH16	х			
589111611 CH family 17 GH17 x 589113629 CH 18 protein (chitinase) GH18 x x 589108051 CH family 28 GH18 x x 358380963 CH family 28 protein GH28 x x 589103027 CH family 38 protein GH38 x x 589103027 CH family 43 protein GH43 x x 589103027 CH family 43 protein GH47 x x 589103027 CH family 47 protein GH47 x x 58910105 CH family 47 protein GH47 x x 589100379 CH family 54 (lignin-degrading) GH55 x x 5891115645 CH family 71 protein GH71 x x 589103161 CH family 71 protein GH71 x x 589103155 CH family 71 protein GH71 x x 589103161 CH family 71 protein GH71 x x 589103155 CH family 74 protein GH71 x x 58910131 <	358382969		GH family 16 protein	GH17	х			
589113629 GH 18 protein (chitinase) GH18 x x 317028062 GH, family 18 GH18 x x 589109851 GH family 28 GH28 x x 589109851 GH family 28 protein GH28 x x 572273805 Family 31 GH GH31 x x 589103027 GH family 43 protein GH38 x x 58910105 GH family 43 protein GH43 x x 631371154 GH family 47 protein GH47 x x 589100379 GH family 54 (lignin-degrading) GH57 x x 589101645 GH family 55 GH55 x x 58910161 GH family 71 protein GH71 x x 58910161 GH family 71 protein GH71 x x 58910185 GH family 72 (lignin-degrading) GH72 x x 58910181 GH 92 GH92 x x x 589108435 GH family 72 protein GH74 x x 589108631 <td>589111611</td> <td></td> <td>GH family 17</td> <td>GH17</td> <td>х</td> <td></td> <td></td> <td></td>	589111611		GH family 17	GH17	х			
317028062 GH, family 18 GH18 x 589109851 GH family 28 GH28 x 358380963 GH family 28 protein GH28 x 572273805 Family 31 GH GH31 x x 589103027 GH family 38 protein GH38 x x 589103027 GH family 43 protein GH43 x x 58910105 GH family 47 protein GH47 x x 631371154 GH family 54 (lignin-degrading) GH57 x x 58910379 GH family 71 protein GH77 x x 589115645 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589103161 GH family 72 (lignin-degrading) GH72 x x 589103161 GH family 74 protein GH74 x x x 58910155 GH family 72 (lignin-degrading) GH74 x x x 589108435 GH family 72 protein GH74 x x x <t< td=""><td>589113629</td><td></td><td>GH 18 protein (chitinase)</td><td>GH18</td><td>х</td><td>х</td><td></td><td></td></t<>	589113629		GH 18 protein (chitinase)	GH18	х	х		
589109851 GH family 28 GH28 x 358380963 GH family 28 protein GH28 x 572273805 Family 31 GH GH31 x x 589103027 GH family 38 protein GH33 x x 358387943 GH family 43 protein GH43 x x 58910105 GH family 47 protein GH47 x x 631371154 GH family 54 (lignin-degrading) GH57 x x 589100379 GH family 54 (lignin-degrading) GH57 x x 589115645 GH family 55 GH57 x x 589103161 GH family 71 protein GH71 x x 589109155 GH family 71 protein GH71 x x 589109155 GH family 74 protein GH74 x x 589108435 GH family 92 GH92 x x 58910807 GH family 92 GH92 x x 589108087 GH family 92 GH92 x x 589105897 Predicted protein -	317028062		GH, family 18	GH18			х	
358380963 GH family 28 protein GH28 x 572273805 Family 31 GH GH31 x x 589103027 GH family 38 protein GH38 x 589103027 GH family 38 protein GH38 x 589103027 GH family 43 protein GH43 x 58910105 GH family 47 GH47 x x 631371154 GH family 47 protein GH47 x x 589100379 GH family 54 (lignin-degrading) GH57 x x 589114155 GH family 71 protein GH67 x x 589103161 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589109155 GH family 71 protein GH71 x x 589108435 GH 74 GH 92 X x 589108087 GH family 92 GH92 X x 589108087 Predicted protein - x x 58910909 Predicted protein - x x	589109851		GH family 28	GH28	х			
572273805 Family 31 GH GH31 x x 589103027 GH family 38 protein GH38 x 358387943 GH family 43 protein GH43 x 58910105 GH family 47 protein GH47 x x 58910379 GH family 47 protein GH47 x x 58910379 GH family 54 (lignin-degrading) GH57 x x 589115645 GH family 55 GH55 x x 589103161 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589108435 GH family 72 (lignin-degrading) GH72 x x 589108435 GH 74 GH74 x x 589108087 GH family 92 GH92 x x 589108087 Predicted protein - x x 58910909 Predicted protein - x x 58910563 Predicted protein - <t< td=""><td>358380963</td><td></td><td>GH family 28 protein</td><td>GH28</td><td>х</td><td></td><td></td><td></td></t<>	358380963		GH family 28 protein	GH28	х			
589103027GH family 38 proteinGH38x358387943GH family 43 proteinGH43x58910105GH family 47 proteinGH47xx58910379GH family 54 (lignin-degrading)GH57xx58910379GH family 55GH55xx589115645GH family 55GH67xx589103161GH family 71 proteinGH71xx589109155GH family 71 proteinGH71xx589109155GH family 72 (lignin-degrading)GH72xx589108435GH family 72 (lignin-degrading)GH74xx589108067GH family 74 proteinGH74xx58910807GH family 74 proteinGH74xx58910807GH family 74 proteinGH74xx58910807GH family 92GH92xx589108087Predicted protein-xx58910909Predicted protein-xx58910909Predicted protein-xx589109109Predicted protein-xx58910926GH family 92GH92xx589105897Predicted protein-xx589113917Predicted protein-xx589113917Predicted protein-xx	572273805		Family 31 GH	GH31	х	х		
358387943 GH family 43 protein GH43 x 589101105 GH family 47 GH47 x x 631371154 GH family 47 protein GH47 x x 589100379 GH family 54 (lignin-degrading) GH57 x x 58910155 GH family 55 GH55 x x 589103161 GH family 71 protein GH71 x x 589109155 GH family 71 protein GH71 x x 589109155 GH family 72 (lignin-degrading) GH72 x x 589108435 GH family 72 (lignin-degrading) GH72 x x 589108435 GH family 74 protein GH74 x x 58910807 GH family 74 protein GH74 x x 58910807 GH family 92 GH92 x x 589105897 Predicted protein - x x 589110909 Predicted protein - x x 589110303 Predicted protein - x x 589110563 Predicte	589103027		GH family 38 protein	GH38		х		
589101105 GH family 47 $CH47$ x x 631371154 GH family 47 protein $CH47$ x x 589100379 GH family 54 (lignin-degrading) $GH57$ x x 589115645 GH family 55 GH55 x x 589115645 GH family 55 GH67 x x 589115645 GH family 71 protein GH71 x x 589103161 GH family 71 protein GH71 x x 589109155 GH family 71 protein GH71 x x 58911135 GH family 72 (lignin-degrading) GH72 x 589108435 GH 74 GH74 x x 589108435 GH family 74 protein GH74 x x 589098631 GH 92 GH92 x x 5891080807 GH family 92 GH92 x x 589105897 Predicted protein - x x 58910563 Predicted protein - x x 589110563 Predicted protein -	358387943		GH family 43 protein	GH43	х			
631371154GH family 47 protein $CH47$ xx589100379GH family 54 (lignin-degrading) $CH57$ xx589115645GH family 55 $CH55$ x589114155GH family 67 $CH67$ x589103161GH family 71 protein $CH71$ x589109155GH family 71 protein $CH71$ x589109155GH family 72 lignin-degrading) $CH72$ x589108435GH family 74 protein $CH74$ x589108435GH family 74 protein $CH74$ x589098631GH 92 $CH92$ x58910807GH family 92 $CH92$ x255722211Predicted protein-x58910909Predicted protein-x589109083Predicted protein-x589109109Predicted protein-x589113917Predicted protein-x	589101105		GH family 47	GH47	х	х		
589100379GH family 54 (lignin-degrading)GH57xx589115645GH family 55GH55x589115645GH family 55GH67x589114155GH family 71 proteinGH71x589103161GH family 71 proteinGH71x589109155GH family 72 (lignin-degrading)GH72x589108435GH 74GH74x589108435GH family 74 proteinGH74x589098631GH 92GH92x58910807GH family 92GH92x255722211Predicted proteinsPredicted protein-x58910909Predicted protein-xx589109153Predicted protein-xx58910807Predicted protein-xx589103897Predicted protein-xx58910533Predicted protein-xx589113917Predicted protein-xx	631371154		GH family 47 protein	GH47	х	х		
589115645GH family 55GH 55x589114155GH family 67GH67x358384989GH family 71 proteinGH71x589103161GH family 71 proteinGH71x589109155GH family 71 proteinGH71x589108435GH 74GH74x358380926GH family 74 proteinGH74x58910807GH 6H 92GH92xx58910807GH family 92GH92xx589108897Predicted protein-xx58910909Predicted protein-xx589113917Predicted protein-xx	589100379		GH family 54 (lignin-degrading)	GH57	х	х		
589114155GH family 67 CH 67 x358384989GH family 71 proteinGH71x589103161GH family 71 proteinGH71x589109155GH family 72 (lignin-degrading)GH72x589108435GH 74GH74xx589098631GH family 72 proteinGH72x589108007GH family 92GH92xx255722211Predicted proteinsPredicted protein-x58910909Predicted protein-xx58910909Predicted protein-xx589109109Predicted protein-xx589109109Predicted protein-xx589113917Predicted protein-xx	589115645		GH family 55	GH55	х			
358384989GH family /1 proteinCH /1x589103161GH family 71 proteinGH 71x589109155GH family 71 proteinGH 71x589109155GH family 72 (lignin-degrading)GH 72x589108435GH 74GH 74xx358380926GH family 72 proteinGH 74xx58910807GH 6H 92GH 92GH 92xx58910807GH family 92GH 92xx255722211Predicted protein-xx589109863Predicted protein-xx589109807Predicted protein-xx589105897Predicted protein-xx589110563Predicted protein-xx589113917Predicted protein-xx	589114155		GH familiy 67	GH67		х		
589103161GH family /1 proteinCH /1x589109155GH family 71 proteinGH 71x589108155GH family 72 (lignin-degrading)GH 72x589108435GH 74GH74xx358380926GH family 72 proteinGH74xx58910807GH 6H 92GH92xx255722211Predicted protein-xx589105897Predicted protein-xx589110909Predicted protein-xx589113917Predicted protein-xx	358384989		GH family /I protein	GH/I	х			
589109155GH family /1 proteinCH /1xx589109155GH family /2 (lignin-degrading)GH/2x589108435GH 74GH74xx358380926GH family 74 proteinGH74xx589098631GH 92GH92xx58910807GH family 92GH92xx255722211Predicted protein-xx589105897Predicted protein-xx58911909Predicted protein-xx589113917Predicted protein-xx	589103161		GH family /I protein	GH/I	х			
589111135GH family /2 (lignin-degrading)CH /2x589108435GH 74GH74xx358380926GH family 74 proteinGH74x589098631GH 92GH92xx589108007GH family 92GH92xx255722211Predicted proteinsPredicted protein-x589105897Predicted protein-xx589105063Predicted protein-xx589105109Predicted protein-xx589113917Predicted protein-xx	589109155		GH family /1 protein	GH/I	х	х		
589108435GH /4GH /4xx358380926GH family 74 proteinGH74x589098631GH 92GH92x589100807GH family 92GH92x255722211Predicted protein-x589105897Predicted protein-x589105897Predicted protein-x58910563Predicted protein-x589113917Predicted protein-x	58911135		GH family /2 (lignin-degrading)	GH/2	х			
358380920GH family /4 proteinGH/4x589098631GH 92GH92xx589100807GH family 92GH92xx255722211Predicted proteinsPredicted protein-x589105897Predicted protein-xx58910909Predicted protein-xx58910563Predicted proteinGH16xx589113917Predicted protein-xx	589108435		GH /4	GH74	х	х		
DescriptionGH 92GH 92CH 92XX589100807GH family 92GH92xx255722211Predicted protein-xx589105897Predicted protein-xx58910909Predicted protein-xx589110563Predicted proteinGH16xx589113917Predicted protein-xx	358380926		GH family /4 protein	GH74	x			
SestrotionGH family 92GH92x255722211Predicted protein-x589105897Predicted protein-x589101909Predicted protein-x589110563Predicted proteinGH16x589113917Predicted protein-x	589098631			GH92	x	х		
255/22211 Predicted protein - X 589105897 Predicted protein - X 589101909 Predicted protein - X 589110563 Predicted protein GH16 X 589113917 Predicted protein - X	589100807		GH IAMIIY 92	GH92	х			
58510507Predicted protein-xx589101909Predicted protein-xx589110563Predicted proteinGH16xx589113917Predicted protein-x	255/22211	Predicted proteins	Predicted protein	-	v	v		х
589110563 Predicted protein - X 589113917 Predicted protein - ×	590101000		Prodicted protein	-	л v	A V		
589113917 Predicted protein – x	580110562		Predicted protein	- СЦ16	л v	л v		
JUJ11JJ11 FICULLEU DIVLE/II – X	500110003		Predicted protein	GITIO	л v	^		
589109549 Predicted protein CH67 v v	589109549		Predicted protein	GH67	x	x		

Table 1 (continued)

Gene ID	Enzyme		Family	ly T. reesei A. a		A. n	iger
				A	В	A	В
589108581	Pr	r Predicted protein	GH16	x			
403411875	Pr	redicted protein	-	х			
589105505	Pr	redicted protein	-	х			
589107107	Pr	redicted protein	-	х	х		
589100041	Pr	redicted protein	-	х	х		
589115849	Pr	redicted protein	-	х			
589099057	Pr	redicted protein	-	х			
589112857	Pr	redicted protein	-	х			
589116001	Pr	redicted protein	-	х			
589113291	Pr	redicted protein	-		х		
589115927	Pr	redicted protein	-		х		
154322591	Pr	redicted protein	-		х		
358390109	Hypothetical proteins Hy	ypothetical protein TRIATDRAFT_129231	-	х			
358386311	Hy	ypothetical protein TRIVIDRAFT_45439	-	х			
358390537	Hy	ypothetical protein TRIATDRAFT_302472	-	х	х		
572280833	Hy	ypothetical protein M419DRAFT_97005	-	х			
116199677	Co	onserved hypothetical protein	-	х			
589112113	Hy	ypothetical protein TRIREDRAFT_66935	-	х	х		
358386247	Hy	ypothetical protein TRIVIDRAFT_179276	-	х			
572280092	Hy	ypothetical protein M419DRAFT_62371	-	х			
572273052	Hy	ypothetical protein M419DRAFT_125562	-	х			
358380920	Hy	ypothetical protein TRIVIDRAFT_118319	-	х			
572284103	Hy	ypothetical protein M419DRAFT_94877	GH71	х	х		
589108875	Hy	ypothetical protein TRIREDRAF1_122487	-	х			
380490319	Hy	ypotnetical protein CH063_07/42	-	x			
338394/18	Hy	vpothetical protein AQL c00172c184	- CDM1	х			
343562011	Hy	vpothetical protein CMDC 04666	CBIVIT		x		
259291566	n,	vpothetical protein TPIVIDPAET 40407	-		X		
358385331	11 <u>1</u>	vpothetical protein TRIVIDRAFT_49497	_		x v		
358388440	Hy	vpothetical protein TRIVIDRAT 1202255	_		x		
358381654	Hy	vpothetical protein TRIVIDRAFT 4609	_		x		
46127631	Hy	vpothetical protein FG08193.1	_		x		
310800235	Hy	vpothetical protein GLRG 10272	_		x		
598027367	Hy	vpothetical protein AURDEDRAFT 162084	_		x		
646290693	H	vpothetical protein BOTBODRAFT_162340	-		х		
598062595	H	vpothetical protein SPAPADRAFT_57777	-		х		
350636308	Hy	ypothetical protein ASPNIDRAFT_182100	GH43			х	
350629486	Hy	ypothetical protein ASPNIDRAFT_47677	GH43			х	
350632025	Hy	ypothetical protein ASPNIDRAFT_128537	-			х	х
145246196	Hy	ypothetical protein ANI_1_1560104	-			х	
350635020	Hy	ypothetical protein ASPNIDRAFT_197780	-			х	
568447829	Hy	ypothetical protein AGABI2DRAFT_199975	GH3			х	
350631594	Hy	ypothetical protein ASPNIDRAFT_53033	GH72			х	х
46122475	Hy	ypothetical protein FG05615.1	-			х	
134082115	Hy	ypothetical protein An15g00620	-			х	
350637823	Hy	ypothetical protein ASPNIDRAFT_52061	GH75			х	х
145258972	Hy	ypothetical protein ANI_1_21/4184	-			х	х
145254/51	Hy	ypothetical protein ANI_1_1218164	-			х	x
145233749	Hy	ypotnetical protein ANI_1_1558024	-			x	x
350630910	Hy	ypometical protein ASPNIDRAF1_54865	_			x	х
350638530	Hy Hy	ypothetical protein ASPNIDRAFT_124700	- CH31			^	v
350638822	nı u	vpothetical protein ASPNIDRAFT 205261	-				x v
350636023	ny u	vnothetical protein ASPNIDRAFT 56680	_				x
350633391	ny u	vnothetical protein ASPNIDRAFT 55058	_				x
350629205	11 <u>1</u>	vpothetical protein ASPNIDRAFT 126525	_				x
145243362	Hy Hy	vpothetical protein ANI 1 1704094	GH1				x
563290941	H	vpothetical protein SBOR 8115	-				x
398407925	H	vpothetical protein MYCGRDRAFT 30155	_				x
350636557	Hy	ypothetical protein ASPNIDRAFT_53540	-				х

Table 2

Major proteins identified in the submerged (A) and sequential (B) fermentation enzymatic extracts from *Trichoderma reesei* + *Aspergillus niger*, which were used in the hydrolysis process of the pretreated sugarcane bagasse at a 1:5 ratio, respectively.

Gene ID	Enzyme		Family	<i>T. reesei</i> + <i>A. niger</i> (1:5)	
				A	В
21842121	Cellulases	Endoglucanase	GH12	х	x
3757552		Endoglucanase A	GH12	х	х
145235569		Endo-beta-1,4-glucanase A	GH12		х
145228915		Endo-beta-1,4-glucanase A	GH12		х
2833231		Endoglucanase I	GH7	х	х
121794		Endoglucanase II	GH5	х	
201066457		Endoglucanase IV (AA9)	GH61	х	х
145235523		Glucan endo-1,3-beta-glucosidase eglC	-	х	х
320592482		Beta-glucanase	-	х	
403314396		Endoglucanase VI (AA9)	GH61	х	
145229151		Endo-1,3(4)-beta-glucanase	GH16	х	х
202072834		Cellobiohydrolase I	GH7	х	х
95115828		Cellobiohydrolase II	GH6	х	х
74698499		1,4-beta-D-glucan cellobiohydrolase	GH7	х	х
201066459		Glucosidase	GH3	х	
126046487		β-glucosidase	GH3	х	х
145242946		β-glucosidase M 4	GH3		х
145255120		Glucan 1,3-beta-glucosidase A	GH5	х	х
400602153		Glucan 1,3-β-glucosidase	GH17	х	
257187		Alpha-glucosidase P2 subunit 5	GH31		х
217025725	Hamicallulação	Endo arabinaço	CUA2		v
145224600	Heillicellulases	Alpha L arabinofuranocidaco avhA	GH45 CUG2		x
250275070		Arabinovulan arabinofuranobudrolaco	GH02 CH62	x	X
1/5000/09/0		Endo 15 alpha L arabinosidasa C		x	X
145255025		Alpha N arabinofuranosidasa P	GH45	x	X
79101601		Applie-IN-diabiliorulaliosidase D	-	x	X
22921545		Formlowl octoraco P	-	x v	
145246174		Formlowl estoraça	-	x v	v
143240174		Ferulic acid esterase		~	x
145247672		Ferulovi esterase B-1	_		x
145230716		Beta-galactosidase F	CH35	v	x
350630290		Alpha-galactosidase extracellular	-	л	x
74626383		Alpha-galactosidase B		v	x
317034650		Alpha-galactosidase D		л	x
307776646		Beta-mannanase	CH5	v	x
358367813		Alpha-mannosidase	CH38	v	A
145233855		Alpha-mannosidase	CH38	x	
572273984		Beta-mannosidase A	GH2	x	
572273001		Putative beta-mannosidase A	GH2	x	x
317032967		Beta-mannosidase A	GH2	x	x
358369379		Beta-mannosidase (MndA)	GH2	A	x
145230794		Alpha-12-mannosidase 1B	GH47	x	x
145256261		Pectate lyase nlyB	_		x
572278177		Pectin lyase-like protein	_	x	x
165906534		Endoxylanase	GH10	x	x
11513450		Acetyl Xylan Esterase	_	x	x
292495278		Endo-1.4-beta-xylanase C	GH10	x	x
549461		Endo-14-beta-xylanase 2	GH11	x	x
145250044		Endo-1,4-beta-xylanase 5	GH11	x	x
157488002	Hemicellulases	Swollenin	CBM1	x	х
9858848		Xvlanase	GH11	x	
42716406		Xvlanase	GH11	x	x
13242071		Xvlanase	GH11		x
26514830		Xvlanase	GH11		x
83638302		Xylanase	GH11		x

Table 2 (continued)

Gene ID	Enzyme		Family	T. ree (1:5)	sei + A. niger
				A	В
380293098		Xylanase II	GH11	х	х
145242002		Alpha-xylosidase	GH31	х	х
145230215		Exo-1,4-beta-xylosidase xlnD	GH3	х	х
145243586		Xylosidase/arabinosidase	-	х	х
572278887	Glycoside Hydrolases families	Glycoside Hydrolase (GH)	GH	х	
572275960		GH, partial	GH		х
358381827		GH family 2 protein	GH2	х	
589104105		GH family 3	GH3		х
358388254		GH family 5 protein	GH5	х	
589100793		GH family 10	GH10	х	х
261825113		GH family 15 protein (glucoamylase)	GH15	х	х
589113453		GH family 16	GH16	х	
358382969		GH family 16 protein	GH17	х	
589111611		GH family 17	GH17	х	
589113629		GH 18 protein (chitinase)	GH18	х	х
317028062		GH, family 18	GH18	х	
589109851		GH family 28	GH28	х	
358380963		GH family 28 protein	GH28	х	
572273805		Family 31 GH	GH31	х	х
589103027		GH family 38 protein	GH38		х
358387943		GH family 43 protein	GH43	х	
589101105		GH family 47	GH47	х	х
631371154		GH family 47 protein	GH47	х	х
589100379		GH family 54 (lignin-degrading)	GH57	х	х
589115645		GH family 55	GH55	х	
589114155		GH familiy 67	GH67		х
358384989		GH family 71 protein	GH71	х	
589103161		GH family 71 protein	GH71	х	
589109155	GH families	GH family 71 protein	GH71	х	х
589111135		GH family 72 (lignin-degrading)	GH72	х	
589108435		GH 74	GH74	х	х
358380926		GH family 74 protein	GH74	х	
589098631		GH 92	GH92	х	х
589100807		GH family 92	GH92	х	
255722211	Predicted proteins	Predicted protein	-		х
589105897		Predicted protein	-	х	х
589101909		Predicted protein	-	х	х
589110563		Predicted protein	GH16	х	х
589113917		Predicted protein	-	х	
589109549		Predicted protein	GH67	х	х
589108581		Predicted protein	GH16	х	
403411875		Predicted protein	-	х	
589105505		Predicted protein	-	х	
589107107		Predicted protein	-	х	х
589100041		Predicted protein	-	х	х
589115849		Predicted protein	-	х	
589099057		Predicted protein	-	х	
589112857		Predicted protein	-	х	
589116001		Predicted protein	-	х	
589113291		Predicted protein	-		х
589115927		Predicted protein	-		х
154322591		Predicted protein	-		х
358390109	Hypothetical proteins	Hypothetical protein TRIATDRAFT_129231	-	х	
358386311	*	Hypothetical protein TRIVIDRAFT_45439	-	х	
358390537		Hypothetical protein TRIATDRAFT_302472	-	х	х
572280833		Hypothetical protein M419DRAFT_97005	-	x	

Table 2 (continued)

Gene ID	Enzyme		Family	T. reesei + A. niger (1:5)	
				A	В
116199677		Conserved hypothetical protein	-	x	
589112113		Hypothetical protein TRIREDRAFT_66935	-	х	х
358386247		Hypothetical protein TRIVIDRAFT_179276	-	х	
572280092		Hypothetical protein M419DRAFT_62371	-	х	
572273052		Hypothetical protein M419DRAFT_125562	-	х	
358380920		Hypothetical protein TRIVIDRAFT_118319	-	х	
572284103		Hypothetical protein M419DRAFT_94877	GH71	х	х
589108875		Hypothetical protein TRIREDRAFT_122487	-	х	
380490319		Hypothetical protein CH063_07742	-	х	
358394718		Hypothetical protein TRIATDRAFT_300431	-	х	
345562011		Hypothetical protein AOL_s00173g184	CBM1		х
440640361		Hypothetical protein GMDG_04666	-		х
358381566		Hypothetical protein TRIVIDRAFT_49497	-		х
358385331		Hypothetical protein TRIVIDRAFT_60255	-		х
358388440		Hypothetical protein TRIVIDRAFT_141673	-		х
358381654		Hypothetical protein TRIVIDRAFT_4609	-		х
46127631		Hypothetical protein FG08193.1	-		х
310800235		Hypothetical protein GLRG_10272	-		х
598027367		Hypothetical protein AURDEDRAFT_162084	-		х
646290693		Hypothetical protein BOTBODRAFT_162340	-		х
598062595		Hypothetical protein SPAPADRAFT_57777	-		х
350636308		Hypothetical protein ASPNIDRAFT_182100	GH43	х	
350629486		Hypothetical protein ASPNIDRAFT_47677	GH43	х	
350632025		Hypothetical protein ASPNIDRAFT_128537	-	х	х
145246196		Hypothetical protein ANI_1_1560104	-	х	
350635020		Hypothetical protein ASPNIDRAFT_197780	-	x	
568447829	Hypothetical proteins	Hypothetical protein AGABI2DRAFT_199975	GH3	х	
350631594		Hypothetical protein ASPNIDRAFT_53033	GH72	х	х
46122475		Hypothetical protein FG05615.1	-	х	
134082115		Hypothetical protein An15g00620	-	х	
350637823		Hypothetical protein ASPNIDRAFT_52061	GH75	х	х
145258972		Hypothetical protein ANI_1_2174184	-	х	х
145254751		Hypothetical protein ANI_1_1218164	-	х	х
145233749		Hypothetical protein ANI_1_1558024	-	х	х
350633910		Hypothetical protein ASPNIDRAFT_54865	-	х	х
350639816		Hypothetical protein ASPNIDRAFT_124700	-	х	
350638529		Hypothetical protein ASPNIDRAFT_119858	GH31		х
350638823		Hypothetical protein ASPNIDRAFT_205361	-		х
350636991		Hypothetical protein ASPNIDRAFT_56689	-		х
350633205		Hypothetical protein ASPNIDRAFT_55058	-		х
350629696		Hypothetical protein ASPNIDRAFT_126535	-		х
145243362		Hypothetical protein ANI_1_1704094	GH1		х
563290941		Hypothetical protein SBOR_8115	-		х
398407925		Hypothetical protein MYCGRDRAFT_30155	-		х
350636557		Hypothetical protein ASPNIDRAFT_53540	-		х

100 mL of nutrient medium with 30 g/L of glucose, as described initially from Mandels and Stenberg [2] and adapted by Cunha et al. [3].

In the sequential fermentation, solid state fermentation was initiated using 5 g of dry sugarcane bagasse as solid substrate, and substrate moisture was adjusted through the addition of 12 mL of nutrient medium. The inoculum was added for a final concentration of 10^7 spores/g of dry bagasse in the pre-culture, which was maintained under static conditions for 24 h. Then, the pre-culture step was continued as a submerged fermentation after the addition of 100 mL of nutrient medium enriched with 30 g/L of glucose per 5 g of dry bagasse. After 48 h for both submerged and sequential fermentation, a volume of pre-culture suspension corresponding to 10% (v/v) was transferred to

100 mL of culture medium for enzyme production, which was supplemented with 10 g/L of glucose and 1% (w/v) of steam-exploded non-washed sugarcane bagasse. All cultivation experiments were carried out in triplicate, and the averaged data presented with standard deviations.

3. Secretome analysis

3.1. Sample preparation

Sequence grade Lys–C/Trypsin (Promega) was used to enzymatically digest the samples. Acetone precipitation was performed prior to sample digestion. The protein samples were reduced with a 10 mM dithiothreitol (DTT)/25 mM ammonium bicarbonate solution at 37 °C for 1 h and alkylated at 37 °C also for 1 h using a solution of 97% acetonitrile (ACN), 2% iodoethanol, and 0.5% triethylphosphine (v/v). Samples were dried before adding Lys–C/trypsin to them in a 25:1 ratio of protease to protein. Digestions were carried out in a barocycler NEP2320 (PBI) at 50 °C and 20 kpsi for 2 h. The samples were cleaned over C18 columns (MicroSpin, Nest Group), dried and resuspended in 97% purified water/3% ACN/0.1% formic acid (FA). A volume of 1 μ L was used for LC-MS/MS analysis.

3.2. LC-MS/MS analysis

A nanoLC system (1100 Series LC, Agilent Technologies, Santa Clara, CA) was used to separate the peptides for downstream MS analysis using a C18 reversed phase ZORBAX 300SB-C18 analytical column (0.75 µm 150 mm, 3.5 um) from Agilent. The column was directly connected to New Objective's emission tip coupled to the nano-electrospray ionization (ESI) source of the high resolution hybrid ion trap mass spectrometer LTQ-Orbitrap XL (Thermo Scientific). Elution was conducted using an ACN/0.1% FA (mobile phase B) linear gradient. The column was equilibrated initially for 5 min with 95% H₂O /0.1% FA (mobile phase A) followed by the linear gradient of 5–40% B for 85 min at 0.3uL/min, then from 40–95% B for 12 min. Blank injections were performed in between experimental runs. The resulting eluents were analyzed by a data-dependent positive acquisition mode at full MS scan (30,000 resolution) where the eight most abundant molecular ions were selected and fragmented by collision induced dissociation (CID) using a normalized collision energy of 35% to acquire the data for the LTQ-Orbitrap XL.

3.3. Data analysis

Database search analyses were done using Mascot Daemon version 2.4.0 (Matrix Science) against an all fungal protein database from the NCBI database. Peptide and spectral count data were performed on the searches. For protein identification, at least two peptides detected were considered, and the false discovery rate (FDR) was set to 1%.

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Transparency document. Supplementary material

Transparency data associated with this article can be found in the online version at http://dx.doi. org/10.1016/j.dib.2016.05.080.

References

- [1] C. Florencio, F.M. Cunha, A.C. Badino, C.S. Farinas, E. Ximenes, M.R. Ladisch, Secretome analysis of Trichoderma reesei and Aspergillus niger cultivated by submerged and sequential fermentation process: enzyme production for sugarcane bagasse hydrolysis, Enzym. Microb. Tech. 90 (2016) 53–60.
- M. Mandels, D. Sternberg, Recent advances in cellulase technology, J. Ferment. Technol. 54 (1976) 267–286.
 F.M. Cunha, A.L.G. Bacchin, A.C.L. Horta, T.C. Zangirolami, A.C. Badino, C.S. Farinas, Indirect method for quantification of cellular biomass in a solids containing medium used as pre-culture for cellulase production, Biotechnol. Bioprocess. Eng. 17 (2012) 100-108.