

Figure S1. Cell lysate, a soluble fraction containing 6xHis-tagged chitinase protein, was purified using an imidazole concentration-dependent method using Ni-NTA superflow resin. Purified chitinase protein were analyzed by 4–15% SDS–PAGE, respectively. From the left, XnChi, XhChi, and PtChi are shown.

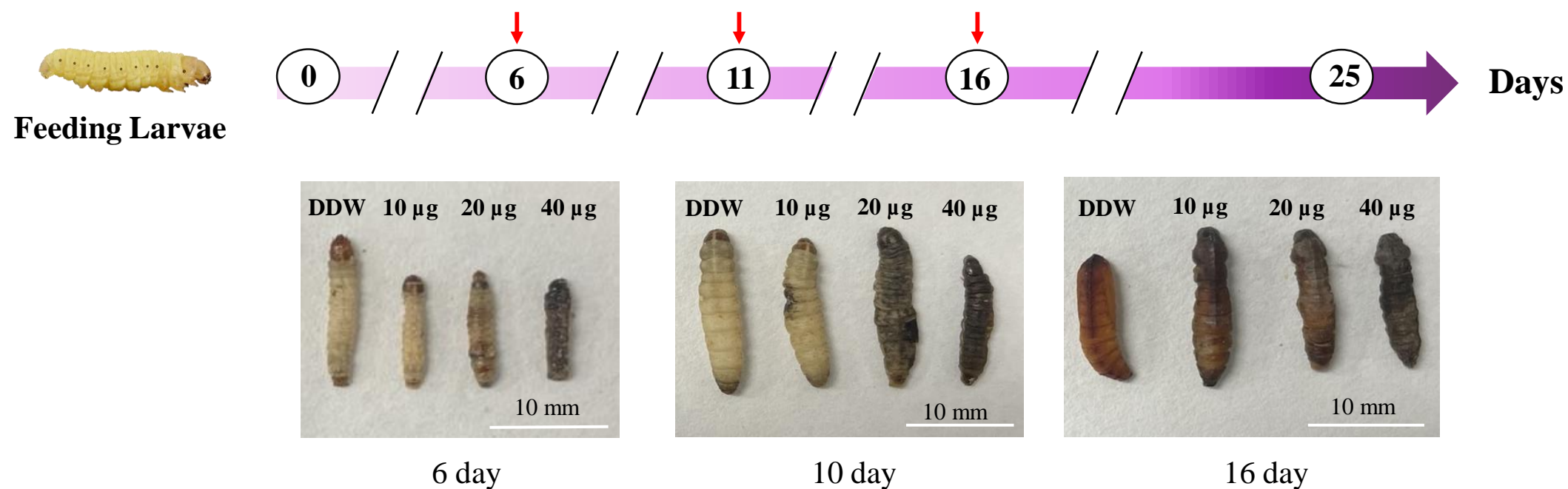


Figure S2. Oral toxicity of XnChi, XhChi, and PtChi against *G. mellonella* was observed on 25 days after treatment. The photograph represents XnChi and the arrow indicates the date of photograph taken. White bar indicates the size of larva and larval length was corrected through the image J program.

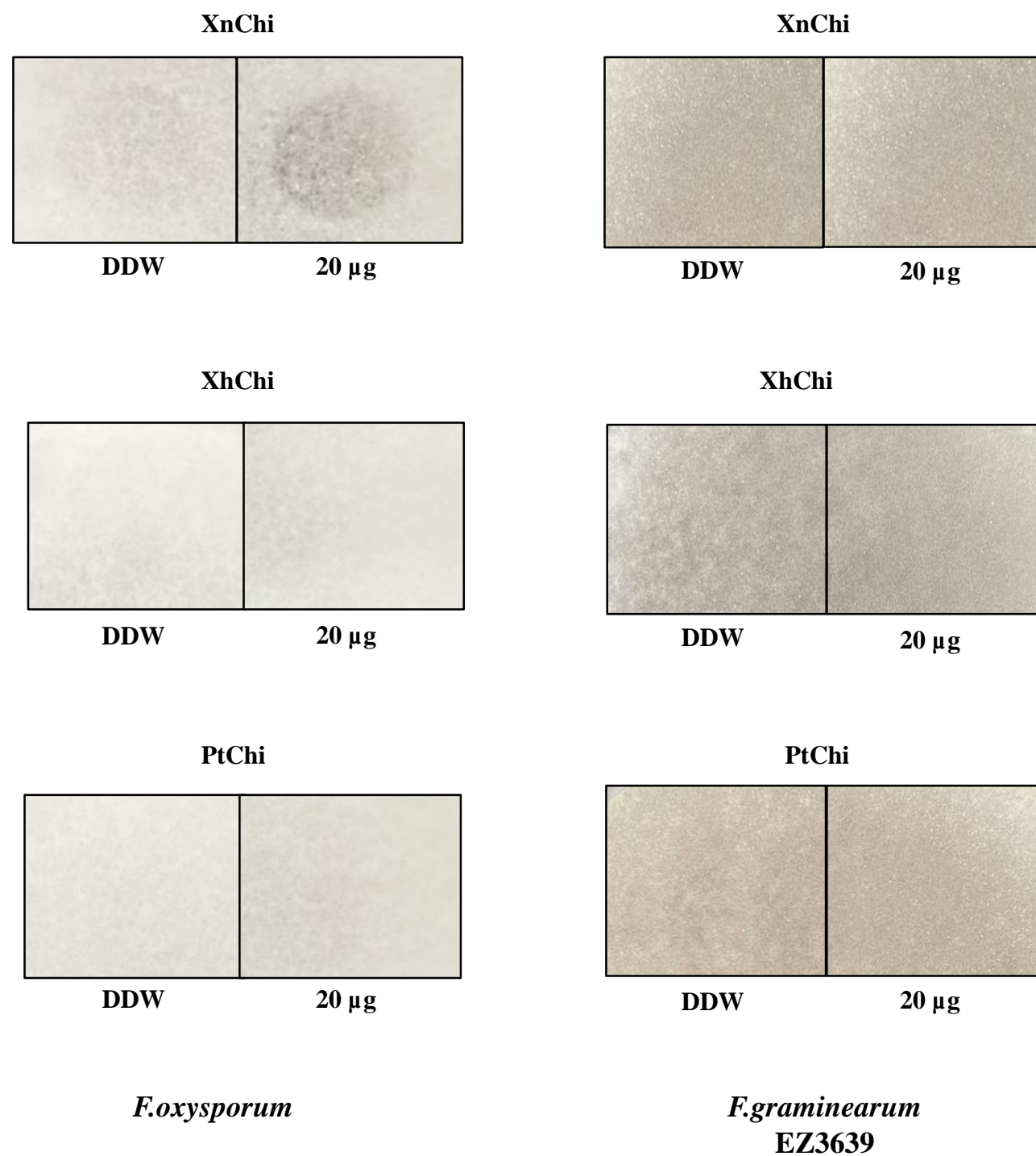


Figure S3. Antifungal activity of XnChi, XhChi, and PtChi (20 µg) against *F. oxysporum* and *F. graminearum*.

Inhibition of mycelial growth by chitinases was shown as a inhibition zone by disc diffusion susceptibility assay. As a control, DDW was used, and no growth inhibition was observed.

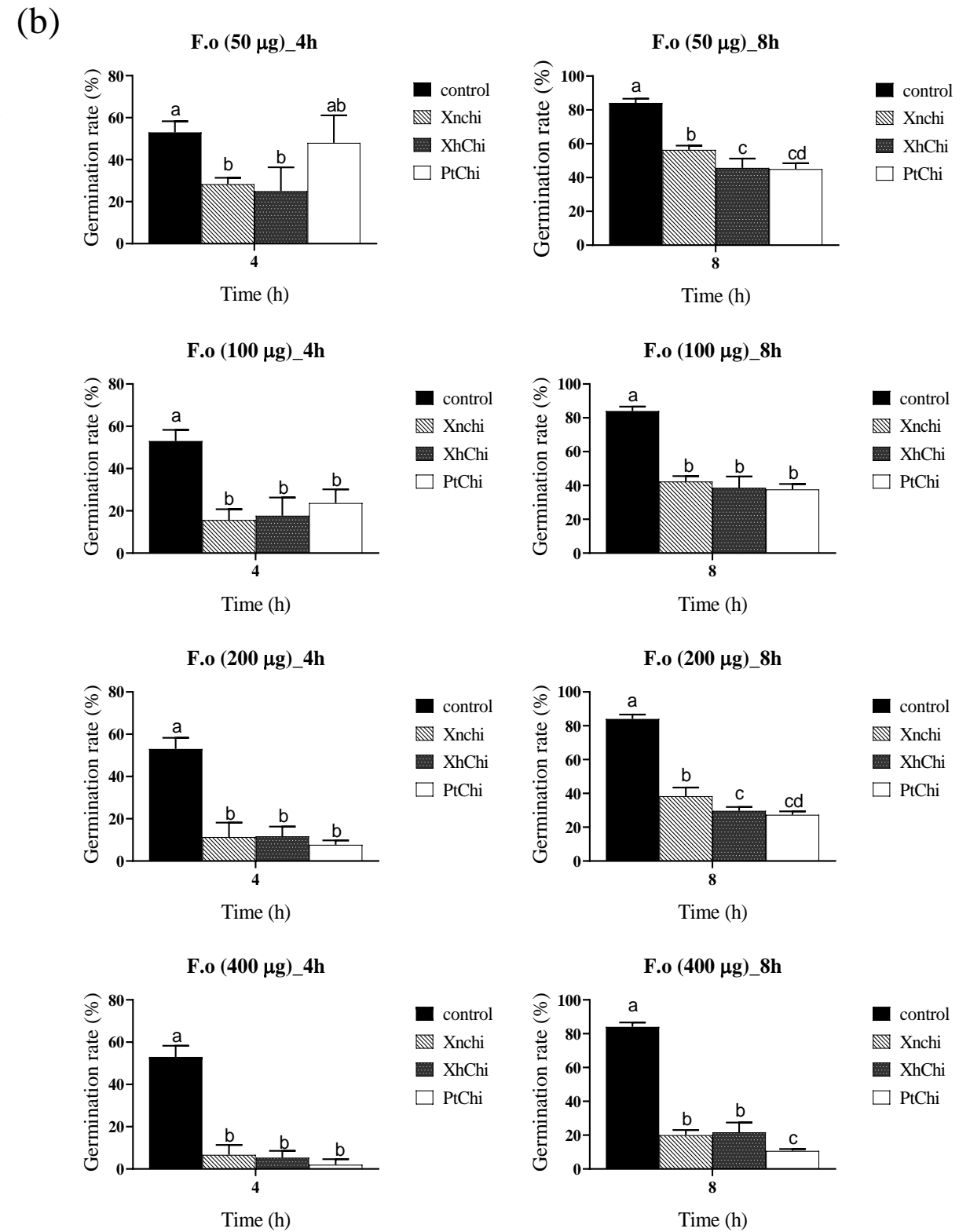
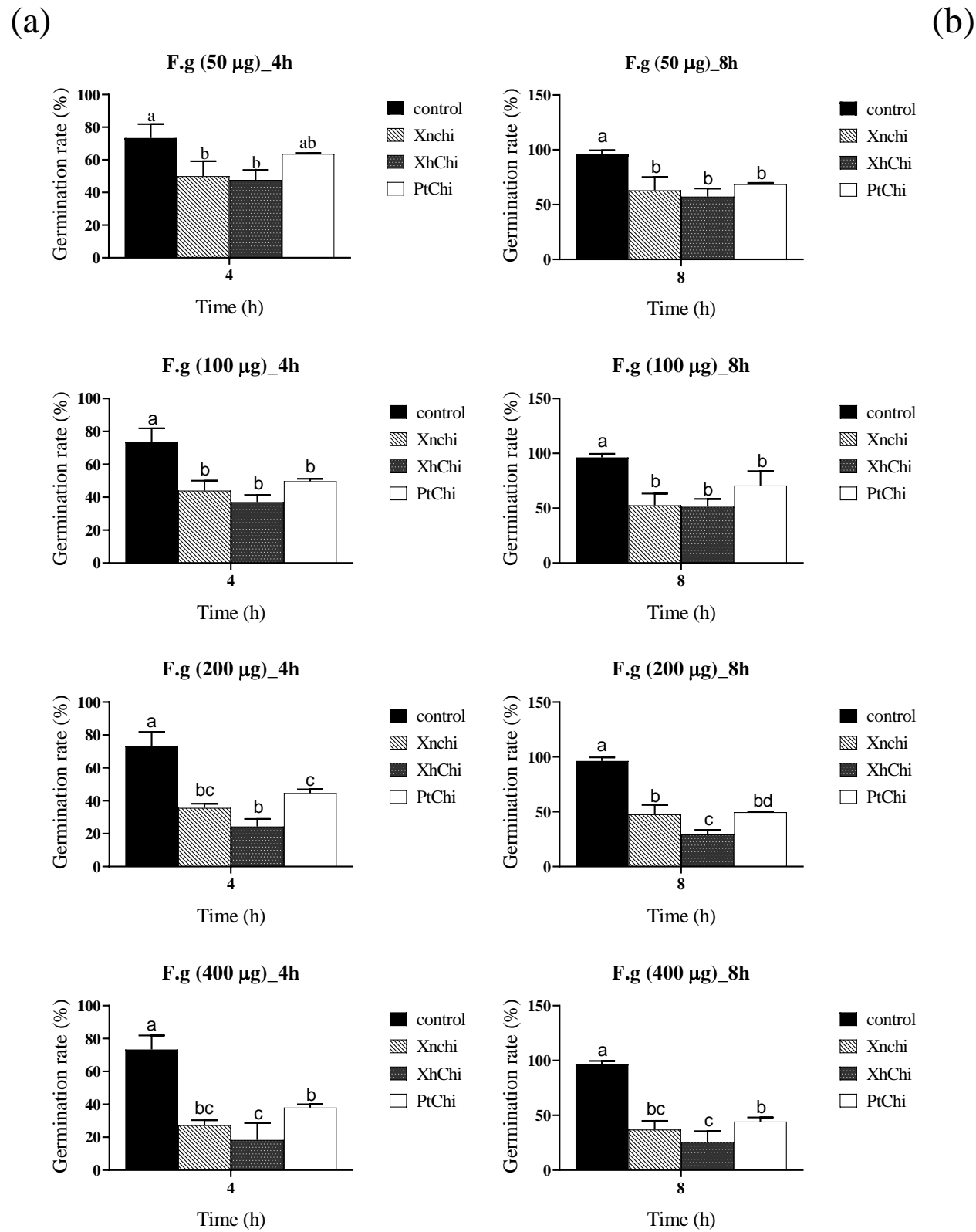


Figure S4. Effect of chitinase on conidial germination of *F.graminearum* (a) and *F.oxysporum* (b). Conidia were inoculated into PDB medium supplemented with or without chitinase in coculture system. Turkey's test was used as *post hoc* method to identify concentration and time of high antifungal activity that showed significant differences.

Table S1. Primer used in the study

Primer	Sequences (5' → 3')
<i>X.nem</i> chitinase-FW (<i>Sac I</i>)	<u>GAGCTC</u> ATGTCTCAAAATGTTTATCGATACCC ¹
<i>X.nem</i> chitinase-RV (<i>Xba I</i>)	<u>TCTAGAC</u> TACGATTTACGACGGGTAC ¹
<i>X.homi</i> chitinase-FW (<i>Sac I</i>)	<u>GAGCTC</u> ATGTCCAAGTTAACTCAAATAGATCCA ¹
<i>X.homi</i> chitinase-RV (<i>Sal I</i>)	<u>GTCGAC</u> TTATTTGCTTGTTTTCCCTTTATAATAGAAAGG ¹
<i>P.tem</i> chitinase-FW (<i>Sac I</i>)	<u>GAGCTC</u> ATGACTGATAACAGTAAATATCAATATACCTGC ¹
<i>P.tem</i> chitinase-RV (<i>Pst I</i>)	<u>CTGCAG</u> TTACTTTTTTACGGGAATTAACATCAGG ¹

¹ The underlined part represents the enzyme cleavage sites.

Table S2. Amino acid sequences of chitinases of type strain used in the study

Strain name	Protein name	GeneBank access	Sequence
<i>Xenorhabdus nematophila</i> ATCC 19061	Glycosyl hydrolase family 18 protein	WP 010846090.1	MSQNVYRYPSIKAMSDASSEVGASLVAWQNNQSGGQTWYVIYDSAVFKNIGWVERWHIPDRNISPDLPVY ENAWQYVREATPEEIADHGNPNTPDVPPGEKTEVLQYDALTEETYQKVGYKPDGSGTPLSYSSARVAKSL YNEYEVDPENTEPLPKVSAYITDWCQYDARLSPETQDNTALTSDDAPGRGFDLEKIPPTAYDRLIFSMAV NGDKGKLSERINEVVDGWNRQAEASSGQIAPITLGHIVPVDPYGDLGTTRNVGLDADQRRDASPKNFLQ YYNQDAASGLLGGLRNLKARAKQAGHKLELAFSIGGWSMSGYFSVMAKDPEQRATFVSSIVDFFRRFP MFTAVDIDWEYPGATGEEGNEFDPEHDGPNYVLLVKELREALNIAFGTRARKEITIACSAVVAKMEKSSFK EIAPYLDNIFVMTYDFFGTGWAHEYIGHHTNLNYPPEYDGDNPPPPNPDRDMDYSADAEIRFLLSQGVQP EKIHLGFANYGRSCLGADLTTRRYNRTGEPLGTMEKGAPEFFCLLNNQYDAEYEIARGKNQFELVTDTET DADALFNADGGHWISLDTPRTVLHKGIYATKMKLGGIFSWSGDQDDGLLANAAHEGLGYLPVRGKEKID MGP LYNKGRLIQLPKVTRRKS
<i>Xenorhabdus hominickii</i> ANU1	Glycosyl hydrolase family 18 protein	WP 010846090.1	MSKLTQIDPLSEESYRLDHFNPATETTKFSYTSGRVSLPVYNKYNVKNKPKVIGYYTDWSQYDSRLQGNQ TPSARGRGIDLQHFLDNPFAYDKLIIGFCGILGDKGEKGSLSIRAAPKFARYNNGEVTFTDEWGCQSYVN CTFPKWQDIQMPRDFNQAKAMGILGGLAKVQGAACAQGHDLAMSFSVGGWTMSNGFYNMVRDKKLK SSFISSLIDIFNRPFMFTEVDIDWEYPGASGNNNPDDKDGEEYISLISDLSTEFKSAGRSDIKISIACSAVPA VMEKSRIPELLNAGLYGINVMTYDFFGTPWANKLMHHTNLRRYPGSENSVEKAVEYLLSVGVPSQAINIG YAGYSRNAKNVDITNYSPLSGSYHPGNGTTTGTTFESGSTEWYDTIYNYLDLESRKDRNLFTLYTDEVADA DYLYNSSSKLFLSIDTPRTVKAKAKYALEKNLGGVFTWTADQDRGLLVNAAREGLECPLLIKIDMAPFY YKGKTSK
<i>Portorhabdus temperata</i> J3	Glycosyl hydrolase family 18 protein	WP 023045972.1	MTDNSKYQYTCKKVMSDASENIGAPLTAWSNQSGGETYYVIFDGQVYKNTYWVERWHIPQRDNTPSYE NAWSWVRAATAEEIAKHGNPKESTVKPIPGDVAILKPDALTEETYQKEGYKPDGSGTNLAYTSARVCHSL YNQYETDRTRPKVSAYITDWCQYDARLPPASKDSKDNEDGPGRGFNLADIPATAYDRLVFSFLGIYGDKG SKKDRINLSAEGWNLQLRPEDPPITFGHIVPVDPYGDLGTTRNVGLPKEDTRDAGPNTFLPFYNQQAASG LLGGLRNLQQAKLAGHRLELAFSIGGWSMSGYFSPMLKDDAQRKTFIDSIVDFFQRFPMFTAVDIDWEY PGAAGEVGNEFDPENDGPNYAILIKLRQALDCAFGTSARKQITIASSAVVGKLKKSNIKELIHNGLDNIFV MTYDFFGNGWAKHIGHHTNLYSAPYASDDPNRDYDISSDEAIKYLIEVEGVPPGKIHLGFANYGRSCIGAD LKTRQYNRNPANPAPALGTMENGAPEFFCLLNNQFDCEQQLAWAKNGFKLMTDTATDADFLYNSTGGHF ISLDTPRTVFKKGIYATEHKLGGIFSWSGDQDCGLLANAAREGAGYIPIKGKEKIDMGPLYNRGELVELPD VNSRKK

Table S3. Amino acid sequences of chitinases used in study

Strain name	Protein name	GeneBank access	Sequences
<i>Xenorhabdus nematophila</i> GJ1-2	XnChi	OR724704	MSQNVYRYPsikamsdasEVgaslVawqNQSGGQTWYVIYDSAVfKNIGWVERWHIPDRNISPDLPVYENAWQ YVREATPEEIADHGPNPTPDVPPGEKTEVLQYDALTEETYQKVGYPDGSGTPLSYSSARVAKSLYNEYEVDPEN TEPLKVSAYITDWCQYDARLSPETQDNTALTSDDAPGRGFDLEKIPPTAYDRLIFSfMAVNGDKGKLSERINEVV DGWNRQAEASSGQIAPITLGHIVPVDPYGDLGTTRNVGLDADQRRDASPKNFLQYYNQDAASGLLGGLRNlKA RAKQAGHKLELAfSIGGWSMSGYfSVMAKDPEQRATfVSSIVDFRRfPMFTAVIDIDWEYPGATGEEGNEFDPEH DGPNYVLLVKELREALNIAFGTRARKEITIACSAVVAkMEKSSfKEIAPYLDNIFVMtyDFFGTGWAEYIGHHTNL YPPRYEYDGDNPPPPNPDRDMDYSADEAIRfLLSQGVQPEKIHLGFANYGRSCLGADLTTRRYNRTGEPLGTMEK GAPEFFCLLNNQYDAEYEIARGKNQfELVTDtETDADALFNADGGHWISLDTPrTVLHKGIYATKMKLGgIFSWs GDQDDGLLANAAHEGLGYLPVRGKEKIDMGPLYNKGRlIQLPKVTRRKS
<i>Xenorhabdus hominickii</i> GJ11-1	XhChi	OR724706	MSKLTQIDPLSEESYRLDHfNPATETTKfSYTSGRVSLPVYNKYNVKNKPKVIGYYTDWSQYDSRLQGNQTPSAR GRGIDLQHFLDNPFAYDKLIIGFCGILGDKGEKGSliSRAAPKFARYNNGEVtFTDEWGDcQSYVNCTfPKWQDIQ MPRDFNQAKAMGILGGLAKVQGAAKAQGHDLAMSfSVGGWTMSNGfYNMVRDKKLKSSfISSliDIFNRfPMf TEVIDIDWEYPGASGNPNPHDDKDGEYYISlIRDLSMEfKSAGRSDIKISIACSAVPAVMEKSRIPELLNAGLYGINV MTYDFFGTPWANKLMHHTNLRRYPGSENSVEKAVEYLLSVGVPSQAINIGYAGYSRNAKNVDITNYSPLSGSYHP NGGTTTGTfESGSTEWYDTIYNyLDLESRKDRNLfTLyTDEVADADYlNssSKLFLSIDTPRTVKAKAKYALEK NLGGVFTWTADQDRGLLVNAAREGLECPllIKKIDMAPfYYKGKTSK
<i>Portorhabdus temperata</i> GJ1-2	PtChi	OR724705	MTDNSKYQYTCKKVMsDASENIGAPLTAWSNQSGGETYYVIFDGQVYKNTYWVERWHIPQRDNTPSYENAWs WVRAATAEEIAKHGNPKESTVKPIPGDVAILKPDALTEETYQKEGYKPDGSGTNLAYTSARVCHSLYNQYETDRT RPKVSAYITDWCQYDARLPPASKDSdKNEDGPGRGFNLADIPATAYDRLVfSFLGIYGDKGSKKDRINLSAEGWN KQLRPEDPPITFGHIVPVDPYGDLGTTRNVGLPKEDTRDAGPNtFLPFYNQQAASGLLGGLRNlQQAKLAGHRL ELAfSIGGWSMSGYfSPMLKDDAQRKtFIDSIVDFfQRfPMFTAVIDIDWEYPGAAGEVGNEFDPENDGPNYAILIK KLRQALDCAFGTSARKQITIASSAVVGKLKKSNIKELIHNGLDNIFVMtyDFFGNGWAKHGHHTNLySAPYASDD PNRDYDISSDEAIKYLIEVEGVPPGKIHLGFANYGRSCIGADLKTRQYNRNpANPAPALGTmENGAPEFFCLLNNQ FDCEQQLAWAKNGfKLMTDTATDADfLYNSTGGHfISLDTPrTVfKKGIYATEHKLGgIFSWSGDQDCGLLANAA REGAGYIPIKGKEKIDMGPLYNRGELVELPDVNSRKK

Table S4. Amino acid sequences of chitinases used in multiple sequence alignment analysis.

Strain name	Protein name	GeneBank access	Sequence
<i>Yersinia entomophaga</i> MH96	Glycosyl hydrolase family 18 protein	ANI28952.1	MESEMEKEEKSNIYDKDPGYVWDNKNECEGAAEETYQELNYEPSISADKLTWTPTRLAKTVFNTYEDD DDFNVLCYFTDWSQYDPRIINKEIRDGTGGRSADILRLNTPDGRPFKRLIYSFGGLIGDKKYSADGNASIAVR LGVATDPDDAIANHKGKTIPVDPDGAVLASINCGFTKWEAGDANERYNQEKAKGLLGGFRLLHEADKEL EFSLSIGGWSMSGLFSEIAKDEILRTNFVEGIKDDFFQRFPMFSLHDIDWEYPGSIGAGNPNSPDDGANFAILI QQITDAKISNLKGISIASSADPAKIDAANIPALMDAGVTGINLMTYDFFTLGDGKLSHHTNIYRDPSDVYSK YSIDDAVTHLIDEKKVDPKAIFIGYAGYTRNAKNATITTSIPSEEALKGTYTDANQTLGSFEYSVLEWTDIIC HYMDFEKGEGRNGYKLVHDKVAKADYLYSEATKVFISLDTPRSVRDKGRYVKDKKGLGGLFIWSGDQDN GILTNAHEGLKRRIKNKVIDMTPFYLDSDEELPTYTEPAEPQCEACNIK
<i>Pseudomonas chloriraphis</i> B25	Chitinase	WP_124321822.1	MYDEKKYQYTSKKAMSDASEGVGNSLAAWNNSQSGGETFYVIFDSGVYTNSYWVERWHVPDRNLES HENAWTYVRPATPQEMAIEHGNPTEGIVEPSDKTQILQPDDLTEKTYVDVNYFPDGSNSLSYTAARVCK SMYNEYEQDRTRDRPHLKVSAYVTDWCQYDARLPPESTRALQPAEDVKPGRGFDLENIPPTAYDRLVFSFL AIYGDKGKLGKEIEAVADGWNSQVEADEAITHGHIVPVDPYGDLGTTRNVAVPPDDRREVGPHNFLQYY NQEAASGLLGGLRNLQERAKKVGHKLELAFSIGGWSMSGYFSPMVKDPQQRRAFVESVVDFFRRFPMF TAVDIDWEYPGTSGEEGNEWDEEHDGPNYAILVGELRKALDGAFGTRARKEITIASSAVVGKLKKSNI IENGLDNIFVMTYDFFGTGWADWIGHHTNLYAPPAENNPDRLYDLSADEAIQYLINDEGVPPGKIHLGFA NYGRSCIGANLSDRTYTKPGMALGTMENGAPEFFCLLNNQFDCEHQLALGKNGFKLMTDTAADADILFN PVGNYHISLDTPRVTVMQKGIYADKEKLGIFSWSGDQDDGLLANAAREGTGYIPKKGREVIDMGPLYNR GELFELPATDQGKIKTAARKRKISKD
<i>Cronobacter sakazakii</i> wls2261	Glycosyl hydrolase family 18 protein	WP_241700376.1	MATSKLIQGDSLTTETSNAADGFNPASETEKYSYTSARVAKPVYNKYKAANKPKVFGYYTDWSQYDGR GDDSPANRGRGYDLAKVSPTAYDKIVFGFLGIVGDKGEKQYTIENAAARQTNKNTNEPTFLDPWGDFQSY ENCGHSTSGWDIDPATVTQATTKGLLGGLRDLQKAKQQGHTLVLSMSGWTSNGFHEMSKTDSSR KTFAAGVVKLFKQFPMFSEVDIDWEYPNAEGNGNPHGPEDGANYALLIAEMKKQLSAAGRSVDKISIA AVVSTLEYSNVKALLDAGLYAINVMTYDFFGTPWADTLTHHTNLTPLTAGGWSIEAVVDYLIAEGFPSDRI NIGYAGYTRNARNAVIESFSPLKGSYSPGNSTTGSFESGSTEWYDTIYNYLDLENQKGRNGFNVYTDKV ANADYLYNPQSKLFMSLDTPRSVMKAKGQYAASRNGLGLFTWTIDQDNGVLVNAAREGLGYEIDTQTIDM KPFYFEGINVAEPDNSGGDSEPQPTVNHAPVAAIQLR

Table S5. Amino acid sequences of chitinases used in phylogenetic analysis.

<i>Photorhabdus khanii</i> HGB1456	Glycosyl hydrolase family 18 protein	WP 152962976.1	MTDNSKYQYTCKKVMSDASENIGAPLTAWSNQSGGETYYVIFDGQVYKNTYWVERWHIPQRDNTPSYE NAWSWVRAATAEEIAKHGNPKEGTVKPIPGDVAILKPDALTEETYQKEGYKPDGSGTNLAYTSARVCHSL YNQYETDRTRPKVSAYITDWCQYDARLPPASKDSDKNEDGPGRGFNLADIPATAYDRLVFSFLGIYGDKG SKKDRINLSAEGWNKQLRPEDPPITFGHIVPVDPYGDLGTTRNVGLPKEDTRDAGPNTFLPFYNQQAASG LLGGLRNLQQAKLAGHRLAFAFSIGGWSMSGYFSPMLKDDAQRKTFIDSIVDFQRFPMFTAVIDIDWEY PGAAGEVGNEFDPENDGPNYAILIKKLRQALDCAFGTSARKQITIASSAVVGKLKKSNIKELIHNLGNIFV MTYDFFGNWAKHIGHHTNLYSAPYASDDPNRDYDISSDEAIKYLIEVEGVPPGKIHLGFANYGRSCIGAD LKTRQYNRNPDPNPAPALGTMENGAPEFFCLLNNQFDCEQQLAWAKNGFKLMTDTATDADFLYNSTGGHF ISLDTPRTVFKKGIYATEHKLGGIFSWSGDQDCGLLANAAREGAGYIPIKGKEKIDMGPLYNRGELVELP D VNSRKK
<i>Pseudomonas chlororaphis</i> B25	Glycosyl hydrolase family 18 protein	WP 124321822.1	MYDEKKYQYTSKKAMSDASEGVGNSLAAWNNQSGGETFYVIFDSGVYTN SYWVERWHVPDRNLESPS HENAWTYVRPATPQEMAIEHGNPTEGIVEPSPDKTQILQPDDLTEKTYVDVNYFPDGSNSLSYTAARVCK SMYNEYEQDRTRDRPHLKVSAYVTDWCQYDARLPPESRALQPAEDVKPGRGFDLENIPPTAYDRLVFSFL AIYGDKGKLGKEIEAVADGWNSQVEADEAITHGHIVPVDPYGDLGTTRNVAVPPDDRREVGPHNFLQYY NQEAASGLLGGLRNLQERAKKVGHKLELAFSIGGWSMSGYFSPMVKDPQQRRAFVESVVDFFRRFPMF TAVDIDWEYPGTSGEEGNEWDEEHDGPNYAILVGELRKALDGAFGTRARKEITIASSAVVGKLKKSNIIRGL IENGLDNIFVMTYDFFGTGWADWIGHHTNLYAPPYAENNPDRLYDLSADEAIQYLINDEGVPPGKIHLGFA NYGRSCIGANLSDRITYTKPGMALGTMENGAPEFFCLLNNQFDCEHQLALGKNGFKLMTDTAADADILFN PVGNYHISLDTPRTVMQKGIYADKEKLGIFSWSGDQDDGLLANAAREGTGYIPKKGREVIDMGPLYNR GELFEL PATDQGKIKTAARKRKISKD
<i>Xenorhabdus nematophila</i> ATCC19061	Glycosyl hydrolase family 18 protein	WP 010846090.1	MSQNVYRYPSIKAMSDASSEVGASLVAWQNSGGQTWYVIYDSAVFKNIGWVERWHIPDRNISPDLPVY ENAWQYVREATPEEIADHGNPNTPDVPPGEKTEVLQYDALTEETYQKVGYKPDGSGTPLSYSSARVAKSL YNEYEVDPENTEPLPKVSAYITDWCQYDARLSPETQDNTALTSDDAPGRGFDLEKIPPTAYDRLIFSMAV NGDKGKLSERINEVVDGWNRQAEASSGQIAPITLGHIVPVDPYGDLGTTRNVGLDADQRRDASPKNFLQ YYNQDAASGLLGGLRNLKARAKQAGHKLELAFSIGGWSMSGYFSVMAKDPEQRATFVSSIVDFRRFP MFTAVIDIDWEYPGATGEEGNEFDPEHDGPNYVLLVKELREALNIAFGTRARKEITIACSAVVAKMEKSSFK EIAPYLDNIFVMTYDFFGTGWAEYIGHHTNLYPPRYEYDGDNPPPPNPDRDMDYSADAEIRFLLSQGVQP EKIHLGFANYGRSCLGADLTTRRYNRTGEPLGTMEKGAPEFFCLLNNQYDAEYEIARGKNQFELVTDTET DADALFNADGGHWISLDTPRTLHKGIYATKMKLGGIFSWSGDQDDGLLANAHEGLGYLPVRGKEKID MGP LYNKGRLIQLPKVTRRS

<i>Photorhabdus laumondii</i> subsp. <i>laumondii</i> TTO1	Chitinase	AXG43067.1	MVNKYTYTSSKSMSDISDIVGEPLTAWNQAGGQVYNVIFNSGVYTNTYWVERWHIPDPTAKEGTPHNA WKYIRPATEDEIKQHGNPTDGRIDPTEDIPSPVLQPDASTEQTYQRPDVNFKPDGSAGNLSYTASRVC RPM YNEYESDKSRPKLSAYITDWCQYDARLDGKNEDADQGRGRGFDLSTINVAAYDKLIFSFLGIYGDTGVKGD KIKEVADGWNSQSEIKITEGHIVPLDPYGDLGTARNVGLPKESANTNINAGTFLPFYQQKKASGLLGGLRE LQKTARLAGHKLELAFSIGGWSMSGYFSVMAADETKRGVFVDSIVDFFARFPMFSCVDIDWEYPGSPGE DGNVYDPKDGEHYALLIKELRESLDSRFGREDRKEISACSGVKTKLATSNIAELVKNGLDNIYLMSYDYF GTGWAPYIGHHTNLYSPKDPDPSGASDLSAEVAINYLHQELGIPLEKIHLYGYANYGRAGKGANLETREYN KTGEALGTMEKGSPEFFDIVNNYLDSEHTLATGKNGFVLMTDTNADADFLFSETEGHFISLDTPRTVKQK AEYVATNKLGGIFSWSGDQDCGLLANAAREGMGYIAKSNDETIDMGPLYNPGKPYYLK SIG
<i>Photorhabdus akhurstii</i> DSM 15138	Glycosyl hydrolase family 18 protein	WP 214039151.1	MVNKYTYTSSKSMSDISDIIGEPLTAWKNQAGGQVYNVIFNGGVYTNTYWVERWHIPDPTAKEGTPHNA WKYIRQATEEEIKEHGNPTDGRVDPTEDIPSPVLQPD DITEKTYQRPDVNFKPDGSAGNLSYTATRVCRPM FNEYESDKSRPKLSAYITDWCQYDARLDGKDDEADDRGRGFDLSTINVTAYDKLIFSFLGIYGDTGVK GK TIKEVADGWNSQSEIKITEGHIVPLDPYGDLGTARNVGLPKESANTDINAGTFLPFYQQKKASGLLGGLRE LQKTARLAGHKLELAFSIGGWSMSGYFSVMAADETKRGVFVDSIVDFFERFPMFSCVDIDWEYPGSPGE DGNVYDPKDGEYYALLIKELRESLDSRFGREDRKEISACSGVKTKLETSNIAELVKNGLDNIYLMSYDYF GTGWAPYIGHHTNLYSPKDPDPSGASDLSAEVAINYLHQDLGIPLEKIHLYGYANYGRAGKGAKLETREYN KTGDALGTMEKGSPEFFDIVNNYLDSEHTLATGKNGFVLMTDTNADADFLFSETAGHFISLDTPRTVKQK AEYVAKNKLGGIFSWSGDQDCGLLANAAREGMGYVAKSNDETIDMGPLYNPGKPYYLK SIG
<i>Yersinia entomophaga</i> MH96	Chitinase	ANI28955.1	MVNKYTYTSSKAMSDISDVIGEPLAAWDSQVGGRVFNVIFD GKVYTNTYWVERWQVPGIGSSDGNPHN AWKFVRAATADEINKIGNPTTADV KPTENIPSPILVEDKYTEETYSRPDVNFKEDGSQGNLSYTATRV CAP MYNHYVGDKTKPKLSAYITDWCQYDARLDGGGSKEEERGRGFDLATLMQN PATYDRLIFSFLGICGDIG NKSKKVQEVWDGWNAQAPSLGLPQIGKGHIVPLDPYGDLGTARNVGLPPESADTSIESGTFLPYYQQNR AAGLLGGLRELQKKAHAMGHKLDLAFSIGGWSLSSYFSALAENPDERRVFVASVVDFFVRFP MFSCVDI DWEYPGGGGDEGNISSDKDGENYVLLIKELRSALDSRFGYSNRKEISACSGVKAKLKKSNIDQLVANGL DNIYLMSYDFFGTIWADYIGHHTNLYSPKDPGEQELFDLSAEAAIDY LHNELGIPMEKIHLYGYANYGRSAV GGDLTTRQYTKNGPALGTMENGAPEFFDIVKNYMDAEHSLSMGKNGFVLMTDTNADADFLFSEAKGHF ISLDTPRTVKQKGEYAAKNKLGGVFSWSGDQDCGLLANAAREGLGYVADSNQETIDMGPLYNPGKEIYL KSISEIKSK

<i>Yersinia nurmii</i> CIP110231T	Insecticidal toxin complex chitinase Chi2	WP 049597577.1	MVNKYTYTSSKAMSDISDVIGEPLAAWNSQVGGRVFNVIFDSKVYTNTYWVERWQVPGIGSSDGNPHN AWKFVRAATVDEINKIGNPTTADV KPTENIPSPILVEDKYTEETYSRPDVNYKEDGSQGNLSYTATRVCAP MYNHYVGDKTKPKLSAYITDWCQYDARLDGGGSKEEERGRGFDLATLMQNPATYDRLIFSFLGICGDIG DKSKKVQEVWDGWNAQASSLGLPQISKGHIVPLDPYGDLGTARNVGLPLESADTSIESGTFLPYYYQQR AAGLLGGLRELQKKAHAMGHKLDLAFSIGGWSLSSYFSALAENPDERRVFVASVVDFFERFPMFSCVDID WEYPGGGGEAGNISSDKDGENYVLLIKELRSALDSRFGYSNRKEISIACSGVKAKLKSNIDQLVANGLD NIY LMSYDFFGTIWADYIGHHTNLYSPKDPGEQELFDLSAEAAIDYLNELAIPEMKIHLGYANYGRSAVGGD LTTRQYTKDGPALGTMENGAPEFFDIVRNYMDVEHSLSTGKNGFVLMTDNADADFLFSEAKGHFISLD TPRTVKQKGEYAAKNKLGGVFSWSGDQDCGLLANAAREGLGYVTQSNQETIDMGPLYNPGKEIYLSIS EIKSK
<i>Xenorhabdus lircayensis</i> VLS	Glycosyl hydrolase family 18 protein	WP 198689572.1	MSKITQIDPLSEESYRLDNFKPATETTKYSYTSGRVALPVYNKYDVKNRPKVIGYYTDWSQYDGRLQGNQ TPSARGRGIDLQHLLDNPFAYDKLIIGFCGILGDKGEKASLISRAAPKFDRHKNGEVTFTDEWGDCQSYVN CTYPGWQDIHMPRDFNQANSMGILGGLAKVQGAARAQGHDLAMSFVGGWTMSNGFFHMVRDNQLK SNFISSLIDIFRRFPMFTEVDIDWEYPGAPGNQNPHDSDDGKYIYSLIRDLSSAFKNEGRSDIKISIACSAVPD IMEKSSIPELLNAGLYGVNVMTYDFFGTPWADKLRHHTNLRRYPGSENSVEKAVEYLLSVGPVPSQAINIG YAGYSRNAKNTNIDSYSPLSGSYNHDKGTTTGTGFESGSTEWYDTIYNYIDLESRKDRNNFTLYTDEVAD ADYLYNQDSKLFLSIDTPRTVKAKAKYALEKNLGGVFTWTADQDRGLLVNAAREGLECPLLIKIDMEPF YYKGKTSK
<i>Photorhabdus laumondii</i> subsp. <i>laumondii</i> TTO1	Chitinase	AXG42878.1	MSKIIQTDSFSEQSYQIDNFPSTETINFSYTSGRIALPVYNKYDTRNKPKVFGYYTDWSQYDGRLQGNQ DPIRRGRGIDLQHLLDNPFAYDKLVIGFCGILGDEGEKKQQIKEQAPLFARTNNGEVTFTDAWGDCQSYQN CTYSGWQDIQMPRDFDQSKSMGVLGGLAKVQQAQAQGHDLMSFVGGWTMSNGFYAMVRDETLKS YFCSSLVDIFQRFPMTFTEIDIDWEYPGVAGNEGNMYASDDGDYVYSLIKDLTAAAFKEAGRSDIKISIACSAV PEKMEKSKIPELLQVGLYGVNVMTYDFFGTPWAERLLHHTNLRNYPGSENSVEKAVEYLLSLGVPASAIN IGYTGYSRNGRNTVIDSYSPLSGSYDPGYVPKKEPKITTTGSFESGTTEWYDTIYNYLDLEEKGRNNFDL YTDEIADADYLYNKDSQLFISLDTPRSVKSQAQYALEKNLGGIFTWTADQDRGLLVNAAREGLGCELITE KIDMTPFYFKGVNVEPVDPIHPDTGSDYPVWDANRAYKAGDRVSWNNQNWEAKWWNRGTEPDGAGT SDAYPWVKIA

<i>Yersinia proxima</i> IP37424	Glycosyl hydrolase family 18 protein	WP 227731375.1	MSLLIQYDEATEKSYDLDGFSAKTETNNYSYTSARVAKSVYNKYNVKGRAKVGYYTDWSQYDGRLDN NQQKSLRGRGVDLALVDPLAYDKLIIGFCGIVGDQGDQKHQLIAQQSPLFGRFYPGEASFIDAWGDCQSYR NCGFPAYQDIPMPQGFNQLNAMGVLGGLRDLQRKALEQGHELALSFSIGGWTMSNAFHDMVRDIHLRQ VFCRSVVDIFTRFPMFSEVDIDWEYPGSAGNNNPFDENDGKCYALLIKELKGMLVAANRPDVKISIACSAI PAIMAKSNIPELISAGLYGLNVMTYDFFGTPWSELVTHHTNLHSTPETSYSVESAVDYLLAQGVPAEAINIG YAGYSRNAKMAKLSLSPLSGNYNPGDGNTTGTGTFDSGSTEWYDIINNYLDLENRKGRNGFNLYTDEVAD ADYLYNPESSLFISIDTPRTVKAKAEYVKKNLGGIFTWTADQDQGLLVNAAREGLECPVVKQNIIDMSPF YFKGINVTPSPIEAIRTVITGPTISKIGDKVTLSENSSSATPGSLQFTWITPDSVNPDAKDKSVISFIVPSVNS SMEKLQFMLSVTDGVDHATVSHSISVVSPPDYPEWQKEATYIASDRVSWKGDNWEAKWWTYAAEPGTA DPTDAYPWKKLI
<i>Cronobacter sakazakii</i> wls2261	Glycosyl hydrolase family 18 protein	WP 241700376.1	MATSKLIQGDSLTETSNAADGFNPASETEKYSYTSARVAKPVYNKYKAANKPKVFGYYTDWSQYDGRQLQ GDDSPANRGRGYDLAKVSPTAYDKIVFGFLGIVGDKGEKQYTIENAARQTNKNTNEPTFLDPWGDFQSY ENCGHTTSGWDIDPATVTQATTKGLLGGLRDLQQKAKQQGHTLVLSMSIGGWTMSNGFHEMSKTDSSR KTFAAGVVKLFKQFPMFSEVDIDWEYPNAEGNGNPHGPEDGANYALLIAEMKKQLSAAGRSDVKISIASS AVVSTLEYSNVKALLDAGLYAINVMTYDFFGTPWADTLTHHTNLPLTAGGWSIEAVVDYLIAEGFPSDRI NIGYAGYTRNARNAVIESFSPLKGSYSPGNGTTTGSFESGSTEWYDTIYNYLDLENQKGRNGFNVYTDKV ANADYLYNPQSKLFMSLDTPRSVKAKGQYAASRNLGGLFTWTIDQDNGVLVNAAREGLGYEIDTQTIDM KPFYFEGINVAEPDNSGGDSEPQPTVNHAPVAAIQLR
<i>Photorhabdus laumondii</i> subsp. <i>laumondii</i> DJC	Chitinase	AXG43070.1	MATSKLIQGDSLTETSNAADGFNPASETEKYSYTSARVAKPVYNKYKAANKPKVFGYYTDWSQYDGRQLQ GDDSPANRGRGYDLAKVSPTAYDKIVFGFLGIVGDKGEKQYTIENAARQTNKNTNEPTFLDPWGDFQSY ENCGHTTSGWDIDPATVTQATTKGLLGGLRDLQQKAKQQGHTLVLSMSIGGWTMSNGFHEMSKTDSSR KTFAAGVVKLFKQFPMFSEVDIDWEYPNAEGNGNPHGPEDGANYALLIAEMKKQLSAAGRSDVKISIASS AVVSTLEYSNVKALLDAGLYAINVMTYDFFGTPWADTLTHHTNLPLTAGGWSIEAVVDYLIAEGFPSDRI NIGYAGYTRNARNAVIESFSPLKGSYSPGNGTTTGSFESGSTEWYDTIYNYLDLENQKGRNGFNVYTDKV ANADYLYNPQSKLFMSLDTPRSVKAKGQYAASRNLGGLFTWTIDQDNGVLVNAAREGLGYEIDTQTIDM KPFYFEGINVAEPDNSGGDSEPQPTVNHAPVAAIQLR

<i>Yersinia entomophaga</i> MH96	Chitinase	ANI28952.1	MESEMEKEEEKSNLIYDKDPGYVWDNKNECEGAAEETYQELNYEPSISADKLTWTPTRLAKTVFNTYEDD DDFNVLCYFTDWSQYDPRIINKEIRD TGGRSADILRLNTPDGRPFKRLIYSFGGLIGDKKYSADGNASIAVR LGVATDPDDAIA NHKGKTIPVDPDGAVLASINCGFTKWEAGDANERYNQEKAKGLLGGFRLLHEADKEL EFSLSIGGWSMSGLFSEIAKDEILRTNFVEGIKDFQRFPMFSHLDIDWEYPGSIGAGNPNSPDDGANFAILI QQITDAKISNLKGISIASSADPAKIDAANIPALMDAGVTGINLMTYDFFTLGDGKLSHHTNIYRDPSDVYSK YSIDDAVTHLIDEKKVDPKAIFIGYAGYTRNAKNATITTSIPSEEALKGYTDANQTLGSFEYSVLEWTDIIC HYMDFEKGEGRNGYKLVHDKVAKADYLYSEATKVFIISLDTPRSVRDKGRYVKDKGLGGLFIWSGDQDN GILTNA AHEGLKRRIKNKVIDMTPFYLDSD EELPTYTEPAEPQCEACNIK
<i>Xenorhabdus nematophila</i> HB310	Chitinase 60	AGK44778	MPSSKNSNLNDNPFIIPDPGTETKPGDIWGAGATEKTYEVNEFDPSTADSDLSYTPGRIAKNVFNHYESV SGFEVFGYLSDWGIYDSRYGNAPGDTDVDYGE GGRGTDIMRLLDEGSPLPYFDRIIVGFAGIIGDEGLKEA TINQA AIDFKIASDEDDLPNHKGEATFTDYWGDTGAYLNCGFPGWKETDFTPEN AQGVLGALVKLHKKY PDMPIGLSLGGWSMSQAFHFIAQEPELRQRLAQSLKKIFDLFPMFTDLDL DWEYPNYKGEEHNSYDEEDP ENFAELIKEIRKELPDITISIATIAVPAGLEAANIPLLLEAGVDKLNVMTYDFFGTPWAETLGHHTALKLNP D KEETQNSVDKAVNYLLDELHVEPKKINIGYAGYTRNAQQASIPSISPIYGRYTPRGDIALGSFESGSTEWPD LLRNYLDSNMDGINNFTVYTDEVAKAEFLYNQESRLFMSLDTPYSVKEKAQYVKEKGLGGMFIWMIDH DNGLLTNAAREGLGAATVGTPRVDMAPLCLSA AEKAKNRTK
<i>Pseudomonas fluorescens</i> MP-13	Chitinase	AIU96334.1	MSKFDFTLLKSAVSDAASLMPSIAGKKILMGIWHNWPAGPSDGYQRGQFANIALHDVPKDYNV VAVAFM KGNGIPTFNPYNLSDAEFRRQVGVLNSQGRAVLISLGGADAHIELHKGNEQPLANEIIRLVSTYGF DGLDI DLEQSAIDFADNKTVLPAALKLVKDHYAGEGKHFIIMAPEFPYLTTAGKYVGYLQALEGYYDFIAPQYYN QRGDGIWVQEANNNGAWIAQNNDAMKEDFLYYLTESLVSGTRGFTRIPADKFVIGLPD NVDA AATGYV INPAAVVNAFKRLDAKGLSIKGLMTWSVNWDNAVNDHVPYNW EFSRRYGPLINGKRLSWHEEALAAT EVANTL

<i>Pseudomonas protegens</i> CHA0	Glycosyl hydrolase family 18 protein	WP 015634913.1	MDKIDFALIKSQAADAASLMPSIAGKKVLMGFWHNWAAGHSDGYQQGQFANLDLVDVPKEYNVVAVAF MKGNGIPTFKPYNLSDAEFRQVGVLNSQGRAVLISLGGADAHIELHKGNEQPLANEIIRLVETYGFDGLD IDLEQSAIDFADNKSVLPAALKLVKDHYAGQGKHFIISMAPEFPYLTSNGKYVAYLQALEGYIDFVAPQFY NQGGDGLWVQEANGGQGAWIAQNNDAMKEDFLYYLSESLASGTRGFTRIAADKLVIGLPSNVDAAATG YVIDPSAVSNAFKRLQGAGHAIKGLMTWSVNW DAGISRQGV PYNWEFRHRYAPLIHGDGGEPERPGAPG NLMVLGTSRSSVNL SWGVSGSVRPVEFY TLYRDGN AVARTPSPGFEDQGLSADTQYSYFVTATDTQQQES LPSRSVSARTAGGAVDPSFPEWRTSQHYLREDGV TYEGNRYLCLQEHTSNPGWTPSVAFTLWSKVLQERH G
<i>Serratia marcescens</i> GEI	Chitinase B	ACX42072.1	MSTRKAVIGYYFIPTNQINNYTESDTSIVPPVSNITPAKAKQLTHINFSFLDINSNLECAWDPATNDAK ARDVVKRLTALKAHNP NLRIMFSIGGWYY SNDLGVSHANYVNAVKT PASRTKFAQSCVRIMKDYGFDGV DIDWEYPQAAEVDGFIAALQEIRTLNQQTVADGRQALPYQLTIAGAGGAFFLSRYYSKLAQIVAPLDYIN LMTYDLAGPWEKITNHQAALFGDAAGPTFYNALREANLGWSWEELTRAFSPFSLTVDAAVQQHLMME GVPSAKIVMGVPFYGRAFKGVSGGNGGQYSSHSTPGEDPY PSTDYWLVGCEECVRDKDPRIAS YRQLEQ MLQGN YGYQRLWNDKTKTPYLYHAQNGLFVTYDDAESFKYKAKYIKQQQLGGVMFWHLGQDNRNGD LLAALDRYFNAADYDDSQLDMGTGLRYTGVGPGNLPIMTAPAYVPGTIYAQGALVSYQGYVWQTKWGY ITSAPGSDSAWLKVGRVA
<i>Serratia proteamaculans</i> 336x	ChiB	AGF70636.1	MSERKAVIGYYFIPTNQINNYTESDTSIVPPVSNITPAKAKQLTHINFSFLDINSNLECAWDPATNDAK ARDVVSRLTALKAHNP SLRIMFSIGGWYY SNDLGVSHANYVNAVKT PAARTKFAQSCVRIMKDYGFDGV DIDWEYPQSSEVDGFVAALQEIRTLNQQTLTDGRQALPYQLTIAGAGGAFFLSRYYSKL PQIVASLDYINL MTYDLAGPWEKITNHQAGLFGDSAGPTFYNALREANLGWSWEELTRAFSPFSLTVDAAVQQHLMLEG VPSNKIVMGVPFYGRAFKGVSSSNGGQYSSHSTPGEDPFP GTDYWLVGCEECVRDKDPRIAS YRQLEQM LLGNYGYQRLWNDKTKTPYLYHAANGLFVTYDDVESFKYKAKYIKQQQLGGVMFWHLGQDNRNGDL LASLDRYFNAADYDDSQLDMGTGLRYTGVGPGNLPIMSAPAYVAGTTYNQ GALVSYLGYVWQTKWGYI TSVPGSDSAWLKVGRVA

<i>Bacillus pumilus</i> MCB-7	Chitinase A	ALX35002.1	MNKVLVNKSKKFLVLSFISAMILSLSLFNGEVAKASSDKSYKIIGYYPSWGAYGRDYQVWMDASKVSHI NYAFADICWEGRHGNPDPTGPNPQTWSCQDENGVIDAPYGSIVMGDPWIDAQKSNAGDAWDEPIRGNSK QLLKLKKNHPLKKTfISGGGWSWSNRFSOVAADPAARENFAASAVNLLRKYGFDGVDLDWEYPVSGGL PGNSTRPEDKRNYTLLLQDVPKKLDAAEAKDGKKYLLTIASGASPEYVSNTELD KIAETVDWINSMTYDF NGGWQSINAHNAPLFYDPKAKEAGVPNAETFNIESTVKRYKEAGVKADKLVLGTPFYGRGWSNCEPGD NGEYQKCGPGKEGTWEKGVFDISDLEKNYINKNGYKRYWNDRAKVPFLYYAENGNFITYDDEESYGYK TDLIQSNGLSGAMFWDFSGDSNQTLNKL AADLGFA PGGRNPEPPSSAPENVRVTEKTAASVSLAWDAPS DGANIAEYVLSYKYGSISVKETSAKIGQLKPNTTCSFTVSAKDADGKLHTGPTIEAATNSDQTCGYNEWK DTAVYSVGDRVVFNGKVYEAKWWTKGEQPDQSGESGVWKLIGDCK
<i>Bacillus thuringiensis</i>	Chitinase	AAL17867.1	MAMRSQKFLLLLL SLLLFLPLFTNFITPNLALADSPKQSQKIVGYFPSWG VYGRNYQVADIDASKLTHLN YAFADICWNGKHGNPSTHPDNPNKQTWNCKESGVPLQNKEVPNGTLVLGEPWADVTKSYPVSGTTWED CDKYARCGNFGELKRLKAKYPHLKTIISVGGWTWSNRFSDMAADEKTRKVF AESTVAFLRAYGFDGVDL DWEYPGVETIPGGSYRPEDKQNFTLLLQDVRNALNKAGAEDGKQYLLTIASGASQRYADHTELKKISQIL DWINIMTYDFHGGWEATSNHNAALYKDPNDPAANTNFYVDGAINVYTNEGVPVDKLVLGVPFYG RGW KSCGKENNGQYQPCPKGSDGKLASKGTWDDYSTGDTGVYDYGDLAANYVNKNGFVRYWNDTAKVPY LYNATTGTFISYDDNESMKYKTDYIKTKGLSGAMFWELSGDCRTSPKYSCSGPKLLDTLVKELLGGPINQ KDTEPPTNVKNIVVTNKNSNSVQLNWTASTDNVGVTEYEITAGEEKWSTTTNSITIKNLKPNT EYTFSIIAK DAAGNKSQPTALTVKTDEANTTPPDGNGTATFSVTSNWGSGYNFSIIKNNGTTPIKNWKLEFDYSGNLTQ VWDSKISSKTNNHYVITNAGWNGEIPSGGSITIGGAGTG NPAELLNAVISEN
<i>Bacillus cereus</i> VD133	Glycosyl hydrolase family 18 protein	WP 016111320.1	MRSQKFLLLLL SLLLFLPLFTNFITPNLALADSPKQSQKIVGYFPSWG VYGRNYQVADIDASKLTHLN YAFADICWNGKHGNPSTHPDNPNKQTWNCKESGVPLQNKEVPNGTLVLGEPWADVTKSYPGSGTTWEDCD KYARCGNFGELKRLKAKYPHLKTIISVGGWTWSNRFSDMAADEKTRKVF AESTVAFLRAYGFDGVDLD WEYPGVETIPGGSYRPEDKQNFTLLLQDVRNALNKAGAEDGKQYLLTIASGASQRYADHTELKKISQILD WINIMTYDFHGGWEATSNHNAALYKDPNDPAANTNFYVDGAINVYTNEGVPVDKLVLGVPFYGRGWKS CGKENNGQYQPCPKGSDGKLASKGTWDDYSTGDTGVYDYGDLAANYVNKNGFVRYWNDTAKVPYLY NATTGTFISYDDNESMKYKTDYIKTKGLSGAMFWELSGDCRTSPKYSCSGPKLLDTLVKELLGGPINQKD TEPPTNVKNIVVTNKNSNSVQLNWTASTDNVGVTEYEITAGEEKWSTTTNSITIKNLKPNT EYTFSIIAKDA AGNKSQPTALTVKTDEANTTPPDGNGTATFSVTSNWGSGYNFSIIKNNGTTPIKNWKLEFDYSGNLTQV WDSKISSKTNNHYVITNAGWNGEIPSGGSITIGGAGTG NPAELLNAVISEN