

附表 1 几丁质酶的来源、催化特性、生化特征及生防信息

Annexed table 1 Source, catalytic and biochemical characteristics, and biological control information of chitinase

来源 Source	几丁质酶的名字 Chitinase name	GH 家族 GH family	分子量 Molecular Weight/kDa	最适 pH Optimal pH	最适温度 Optimal temperature/ °C	催化特性 Catalytic characteristics	靶标生物 Target organism	作用方式 Mode of action	参考文献 Reference
细菌几丁质酶 Chitinases from bacteria									
嗜麦芽寡养单胞菌 <i>Stenotrophomonas maltophilia</i>		GH18	52	6.8	45		丝核菌属 <i>Rhizoctonia</i> 镰刀菌属 <i>Fusarium</i> 链格孢属 <i>Alternaria</i>	对植物病原真菌有明显的拮抗作用 Significant antagonism towards phytopathogen fungi	[40]
嗜盐菌 CECT 395 <i>Halobacterium salinarum</i> CECT 395	HsChiA1p	GH18	66.5	7.3	40		几丁质废物 Chitin waste	生物降解 生物转化 Biodegradation Bioconversion	[41]
木聚糖类芽孢杆菌 Z2-4 <i>Paenibacillus xylanexedens</i> Z2-4	PxChi52	GH18	55.5	4.5	65	几丁质结合基序(SxGG)和催化基序(DxDxE) Chitin-binding motif (SxGG) and the catalytic motif (DxDxE)	六出花链格孢 <i>A. alstroemeriae</i> 黑曲霉 <i>Aspergillus niger</i> 灰霉菌 <i>Botrytis cinerea</i> 立枯丝核菌 <i>R. solani</i> 核盘菌 <i>Sclerotinia sclerotiorum</i> 苹果腐烂病菌 <i>Valsa mali</i>	抑制菌丝延伸 Inhibitions of hyphal extension	[44]
真菌几丁质酶 Chitinases from fungi									
家蚕微孢子虫 <i>Nosema bombycis</i>	NbchiA	GH19	na	7.0	40	na	围食膜和几丁质基质 Peritrophic membrane (PM) and chitin substrates	na	[45]
哈茨木霉	Chit42	GH18	na	na	na	深层基质结合	真菌	降解真菌细胞壁	[47]

<i>Trichoderma harzianum</i>						凹槽 Deep substrate binding groove	Fungal	Degradation of the cell wall of fungus	
木霉菌 <i>Trichoderma</i> sp.	Ech30	GH18	30	na	na	有一个较浅、较开放的底物结合位点和七个糖结合子位点 Have a shallower and more open substrate binding site and seven subsites for sugar binding	真菌 Fungal	降解真菌细胞壁 Degradation of the cell wall of fungus	[47]
绿色木霉 <i>T. viride</i>	na	na	30-80	5、7、9	4-70	na	鳞翅目家蚕的围食膜 The PM of the lepidopteran <i>Bombyx mori</i>	损害 PM 的屏障功能 Impair the barrier function of the PM	[26]
病毒几丁质酶 Chitinase from viruses									
Epipotia aporema Granulovirus	Ac-chiAEpapGV	na	63	7	na	na	<i>Anticarsia gemmatalis</i> 幼虫的围食膜 PM of <i>Anticarsia gemmatalis</i> larvae	损害围食膜 Damages PM (peritrophic membrane)	[49]
菜青虫 <i>Pieris rapae</i>	PiraGV-K	GH18	72、70	na	na	多域 Multiple domains	昆虫 Insect	在蜕皮过程中对旧角质层的消化作用，促进宿主的液化 Function in the digestion of the old cuticle during molting promoting liquefaction of the host	[50]
<i>Autographa californica</i> nucleopolyhedrovirus	AcNPV-Chi	GH18	50	na	na	几丁质酶 A N 域，糖 18 域 Chitinase A N domain, and glyco18 domain	蜡螟幼虫 <i>Galleria mellonella</i> larvae	对幼虫的杀虫效果 Insecticidal effects on larvae	[51]
<i>Cydia pomonella</i> granulovirus	CpGV-Chi	GH18	63	na	na	几丁质酶 A N	蜡螟幼虫	对幼虫的杀虫效果	[51]

							域, 糖 18 域 Chitinase A N domain, and glyco18 domain	<i>Galleria mellonella</i> larvae	Insecticidal effects on larvae	
思茅松毛虫的核型多角体病毒 <i>Dendrolimus kikuchii</i> Matsumura nucleopolyhedrovirus	DkChi	GH18	61.6	na	na		PKD1 域 催化域 PKD1 domain catalytic domain	甜菜夜蛾 <i>Spodoptera exigua</i> 美国白蛾 <i>Hyphantria cunea</i> 棉铃虫 <i>Helicoverpa armigera</i> 舞毒蛾 <i>Lymantria dispar</i>	强杀虫活性 Strong insecticidal activity	[52]
草地贪夜蛾核型多角体病毒几 丁质酶 A <i>Autographa californica</i> nucleopolyhedrovirus chitinase A	rChiA	na	57	6	50	na		家蚕 <i>Bombyx mori</i> 绿棉铃虫 <i>Heliothis virescens</i> 链格孢菌 <i>A. alternata</i>	增强 PM 的渗透性 Enhanced the permeability of the PM 抑制植物病原真菌的 孢子萌发和生长 Inhibited spore germination and growth of the phytopatogenic fungus	[53]
植物几丁质酶 Chitinase from plants										
大麦(<i>Hordeum vulgare</i> L.)品种 Haider-93 Barley (<i>Hordeum vulgare</i> L.) variety Haider-93	几丁质酶I基因 chitinase I gene	na	35	na	na	na		番茄早疫病菌 <i>A. solani</i> 镰刀菌属 <i>Fusarium spp.</i> 黄萎病菌 <i>Verticillium dahliae</i> 立枯丝核菌 <i>Rhizoctonia solani</i>	增强对病原真菌的抵 抗 Increase the resistance to fungal pathogens	[56]
大麦几丁质酶II类基因 Barley chitinase class-II gene	SCT-15 SCT-20	na	na	na	na	使用启动子 Using promoter		红腐病 Red rot disease	有效控制 Effective control	[57]
蛾豆(<i>Phaseolus aconitifolius</i>) moth beans (<i>Phaseolus</i> <i>aconitifolius</i>)	na	na	30	5	40	na		菜豆壳孢菌 2165 菌株 <i>Macrophomina phaseolina</i> strain 2165	拮抗病原真菌 Against the fungal pathogen	[58]

尖葫芦种子 <i>Trichosanthes dioica</i> seed	TDSC	na	39 ± 1	5-8	50-60	na	黑曲霉 <i>A. niger</i> 木霉 <i>Trichoderma</i> sp.	展示出抗真菌活性 Showed antifungal activity	[59]
宏基因组几丁质酶 Chitinase from metagenome									
土壤 Soil	Chi18H8	GH18	46	<6	35	催化域 Catalytic domain 插入域 Insertion domain	禾谷镰刀菌 <i>F. graminearum</i> 立枯丝核菌 <i>R. solani</i> 尖孢镰刀菌 <i>F. oxosporum</i> 炭疽病菌 <i>Colletotrichum gloeosporioides</i>	抗真菌活性 抑制生长 Antifungal activity Inhibited growth	[27-28]
青藏高原的湿地 The wetlands on Qinghai-Tibetan Plateau	P1724	GH18	na	6	45	两个 GH18 结构域同时具有几丁质内切酶和几丁质外切酶活性 Two GH18 domains showed both endochitinase and exochitinase activities	na	na	[64]
中国红树林潮滩土壤的宏基因组 The metagenome in the soil of a mangrove tidal flat in China	ChiT-7	GH18	46	6	45	插入结构域 Insertion domain	na	na	[65]

