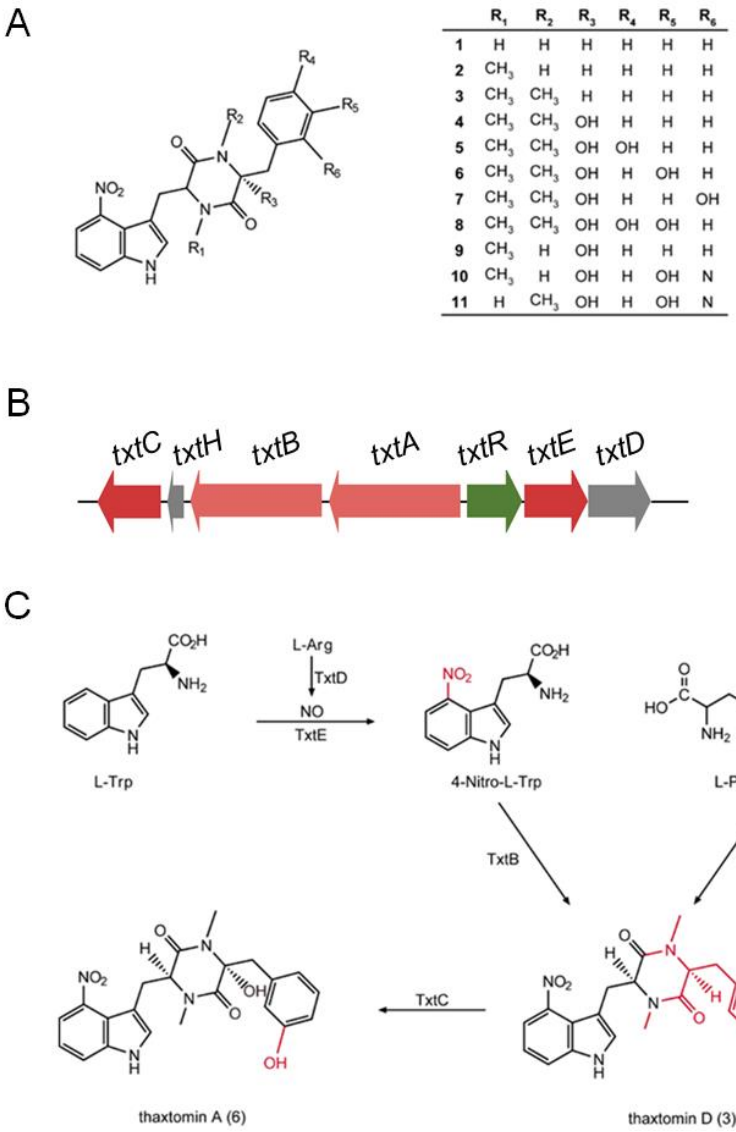
Supporting Information



	R_1	R_2	R_3	R_4	R_5	R_6
1	H	H	H	H	H	H
2	CH_3	H	H	H	H	H
3	CH_3	CH_3	H	H	H	H
4	CH_3	CH_3	OH	H	H	H
5	CH_3	CH_3	OH	OH	H	H
6	CH_3	CH_3	OH	H	OH	H
7	CH_3	CH_3	OH	H	H	OH
8	CH_3	CH_3	OH	OH	OH	H
9	CH_3	H	OH	H	H	H
10	CH_3	H	OH	H	OH	N
11	H	CH_3	OH	H	OH	N

Figure S1. Thaxtomins and the biosynthetic pathway of thaxtomin A. **(A)** Chemical structures of thaxtomins. **(B)** Genetic organization of the thaxtomin A gene cluster from *S. acidsabies* ATCC 49003. **(C)** The biosynthetic pathway of thaxtomin A.

Table S1. PCR primers used in this study.

Primers	Sequence (5′---3′)
	sgRNA template primers
guide RNA-F	gttttagagctagaaatagcaagttaaaataaggctagtc
guide RNA-R	aaaagcaccgactcggtgccacttttcaagttgataacggactagccttattttaact
sgRNA-thax-up	taatacgactcactataggtacgagaaccgtaaggagccgttttagagctagaaatagcaa
sgRNA-thax-down	taatacgactcactatagggtccggccgactccaccgtagttttagagctagaaatagcaa

sgRNA-s1f	taatacgactcactataggggaattcctgccgcgatcccgttttagagctagaaatagcaa
sgRNA-s2f	taatacgactcactataggatcggcttgagcgcgcccacgttttagagctagaaatagcaa
sgRNA-s3f	taatacgactcactatagggacgccgtcacgacgccgcagttttagagctagaaatagcaa
sgRNA-s4f	taatacgactcactataggggaacgaaaactcacgttaagttttagagctagaaatagcaa
vector amplification primers	
thax-vec-F	gcggaccggttcgagtccctggcccgtactagatccttttggttcatgtgcagct
Thax-vec-R	ccgctgccgggcttgctcggagcccggcggtgaagatccttttgataatctcat
yeast element	
URA3-F	tctacggggtctgacgctcagtggaacgaaaactcacgtgcaccacgcttttcaattca
URA3-R	aagatccttttgataatctcatgaccaaaatcccttatggccgcatcttctcaaatatgct
promoter cassettes	
SP43	PH1F：cttccttggggtagtcgaaaagggatgcggagccggggtggccacgactttacacca-tagcgcttgtccgtgtcaa
	PH1R: aatgtgaacacggatctttagacagaacgctgttcacattcgaaccgtctctgctttgacac-ggacaagcgctat
SP42	PH2F：aatgtgaacagcgttctgtctaaagatccgtgttcacattcgaaccgtctctgcttt-gacaacatgctgtgcggt
	PH2R： acaggtatccgttcctctctgtcgtcgagccgcccgtgttcacccgactttacaacaccg-cacagcatgttgtcaa
SP30	PH3F：tcgaccaggcggtatgacgcgagacgccgtcacgacgcctgttcacattcgaac-cgtctctgctttgacatcgtgtggcg
	PH3R： gtgtcgtttcctttccaagaccgcaggcctgggccgtgctggccacgactttacacccaa-gcgccacacgatgtcaaagca
SP24	PM1F： cttccttggggtagtcgaaaagggatgcggagccggggtgttcacattcgaac-cgtctctgctttgacaaccaag
	PM1R： aatgtgaacacggatctttagacagaacgctggccacgactttacattagatgtgcctt-ggttgtcaaagcagaga
SP23	PM2F: aatgtgaacagcgttctgtctaaagatccggttcacattcgaaccgtctctgcttt-gacaacatgctgtgcggtg
	PM2R: aggtatccgttcctctctgtcgtcgagccgcccgtgttagcaggactttacaacaccg-cacagcatgttgtca
SP22	PM3F: tcgaccaggcggtatgacgcgagacgccgtcacgacgcctgttcacattcgaac-cgtctctgctttgacaagtcgcaaaa
	PM3R: gtgtcgtttcctttccaagaccgcaggcctgggccgtgctggccacgactttacaggtt-gttttgcgacttgtcaaagca
SP11	PL1F：cttccttggggtagtcgaaaagggatgcggagccggggtgttcacattcgaac-cgtctctgctttgacaatggct
	PL1R： aatgtgaacacggatctttagacagaacgctggccacgactttacaccccaattcaa-gccattgtcaaagcagaga
SP12	PL2F： aatgtgaacagcgttctgtctaaagatccgtgttcacattcgaaccgtctctgcttt-gacaggtccatacacgcg
	PL2R： aggtatccgttcctctctgtcgtcgagccgcccgtgtggccacgactttacaagcgcgtg-tatggacctgtcaa
SP10	PL3F：tcgaccaggcggtatgacgcgagacgccgtcacgacgcctgttcacattcgaac-cgtctctgctttgacatgttcttacg
	PL3R: gtgtcgtttcctttccaagaccgcaggcctgggccgtgctggccacgactttacatgtgac-cgtaagaacatgtcaaagca
PCR identify	
PF1	tgcacgacattgcactccac
PR1	gagctctcacgcacgctgac

PF2	acccggttcaggcaagacat
PR2	ggtctgctatgtggtgctatctg
PF3	caaggaagcccctgtgaccgt
PR3	gatcgtattcacgcgcgggatg
PF4	tgagcaaggccatcgacacgt
PR4	cgtggcggccgtactgaaat
txtEA-F	cgatggacgggtcggcgagc
txtEA-R	gcgagcgctccctccgggag
txtC-F	ccgggtcaaggcggcctgtg
txtC-R	gcgagttcgccgggtcgacc

Table S2. Sequences of promoters used in this study.

Name	Sequence (5′---3′)
SP43	tgttcacattcgaaccgtctctgctTTGACAcggacaagcgctatggtg-TAAAGTcgtggccA
SP42	tgttcacattcgaaccgtctctgctTTGACAacatgctgtgcggtgtt-gTAAAGTcgggtgaA
SP30	tgttcacattcgaaccgtctctgctTTGACAtcgtgtggcgcttgggtg-TAAAGTcgtggccA
SP24	tgttcacattcgaaccgtctctgctTTGACAac-caaggcacatctaatgTAAAGTcgtggccA
SP23	tgttcacattcgaaccgtctctgctTTGACAacatgctgtgcggtgtt-gTAAAGTcctgctaA
SP22	tgttcacattcgaaccgtctctgctTTGACAagtcgcaaaacaacctg-TAAAGTcgtggccA
SP11	tgttcacattcgaaccgtctctgctTTGACAatggcttgaattggggtg-TAAAGTcgtggccA
SP12	tgttcacattcgaaccgtctctgctTTGACAggtccatacacgcgctt-gTAAAGTcgtggccA
SP10	tgttcacattcgaaccgtctctgctTTGACAtgttcttac-ggtcacatgTAAAGTcgtggccA