

Short Note

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500 ‘Genetic Zipper’ Technology-Based Oligonucleotide Pesticides Generated in 15 Minutes Using DNAInsector Algorithm (dnainsector.com): Fast and Potent Tool for Pest Control

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Short Note

500 'Genetic Zipper' Technology-Based Oligonucleotide Pesticides Generated in 15 Minutes Using DNAInsector Algorithm (dnainsector.com): Fast and Potent Tool for Pest Control

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Abstract

The article provides basic knowledge on how to calculate selectivity of oligonucleotide pesticides when 'genetic zipper' ('GZ') technology is used to provide safety for non-target organisms. Also here we represent 500 'GZ' technology-based oligonucleotide pesticides generated in 15 minutes using DNAInsector algorithm (dnainsector.com) to show that 'GZ' technology is amazing approach transferring us to a new oligo era of development of potent and selective oligonucleotide pesticides based on new principles prompted by nature.

Keywords: DNA insecticides; oligonucleotide pesticides; olinscides; rRNA

Introduction

Today, in plant protection, there is an understanding that it is necessary to create genus- and species-specific pesticides that could solve problems with globally important pests being safe for non-target organisms [1]. Oligonucleotide pesticides based on 'genetic zipper' ('GZ') technology have an easily adaptable structure and a selective DNA containment mechanism of action, which opens up the possibility of effective and well-tailored pest control with minimal side effects [2,3]. Oligonucleotide pesticides can be designed very quickly using DNAInsector program (available at dnainsector.com) or manually, based on pre-rRNA and mature rRNA sequences retrieved from the GenBank database [4]. In practical terms, this means that individuals with basic sequence knowledge can quickly design an oligonucleotide pesticide complementary to the pre-rRNA or mature rRNA of a susceptible to this approach pest with a high probability of success. In this article we represent 500 'GZ' technology-based oligonucleotide pesticides generated in 15 minutes using DNAInsector algorithm (dnainsector.com) to show that 'GZ' technology is amazing approach transferring us to a new oligo era of development of potent and selective oligonucleotide pesticides based on new principles prompted by nature (Table 1). Already today, the 'GZ' technology is potentially capable of controlling 20% of all invertebrate pests with a simple and flexible algorithm [3]. However, to ensure species specificity, it is essential to compare homologous target sites of pre-rRNA and mature rRNA in non-target organisms to prevent off-target effects [3,4].

Table 1. 500 'genetic zipper' technology-based oligonucleotide pesticides generated in 15 minutes using DNAInsector algorithm (dnainsector.com).

No	Reference	Latin name	GenBank ID	Target rRNA	Sequence of oligonucleotide pesticide (5'..3')
APHIDOIDEA					
1.	https://doi.org/10.1007/s10886-012-0121-y	<i>Brachycaudus helichrysi</i>	JX965980.1	12S	ACTAAAATACC
2.	https://doi.org/10.1093/jee/toae041	<i>Myzus cerasi</i>	KX631445.1	16S	CATACAAGTCC
3.	http://dx.doi.org/10.3733/ca.v054n06p26	<i>Aphis gossypii</i>	HG810150.1	16S	TAAATATTAGG
4.	https://doi.org/10.1042/bj0660289	<i>Eucallipterus tiliae</i>	KX631489.1	16S	CATTCTAGTCC
5.	https://doi.org/10.1093/jee/toy157	<i>Metopolophium dirhodum</i>	XR_0096646 40.1	5.8S	TTCATCGATCC
6.	http://dx.doi.org/10.18801/jstei.080119.58	<i>Rhopalosiphum maidis</i>	XR_0034061 01.1	5S	ACTAACTACGC
7.	http://dx.doi.org/10.1603/0046-225X-34.4.938	<i>Hysteroneura setariae</i>	MT116412.1	12S	TAAAATACCGC
8.	https://doi.org/10.1073/pnas.0703535104	<i>Megoura viciae</i>	EU071373.1	ITS2	TCACAACCTGG
9.	https://doi.org/10.1201/9781003169239	<i>Myzus persicae</i>	HG810161.1	16S	AATTAGTTTGC
10.	http://dx.doi.org/10.1515/ausae-2016-0007	<i>Macrosiphum rosae</i>	JX966002.1	12S	TTATAATAGGG
11.	http://dx.doi.org/10.4289/0013-8797.119.1.90	<i>Aphis ruborum</i>	JX965974.1	12S	ATTAATCGTGG
12.	https://doi.org/10.1016/j.asd.2016.01.005	<i>Eriosoma lanigerum</i>	HG810182.1	16S	TTAATCTTAGG
13.	https://doi.org/10.1016/j.plantsci.2014.01.010	<i>Acyrtosiphon pisum</i>	KT199046.1	18S	AAGTAACTTGG
14.	https://doi.org/10.1016/j.micpath.2024.10701	<i>Aphis craccivora</i>	JX965963.1	12S	TAATAAACAGG
15.	https://doi.org/10.1371/journal.pone.0223616	<i>Aphis fabae</i>	KC897347.1	16S	ATTACTCACCC
16.	https://doi.org/10.1017/s0007485320000097	<i>Brevicoryne brassicae</i>	HG810153.1	16S	TAAGTATTAGG
17.	https://doi.org/10.1007/s42976-023-00370-w	<i>Macrosiphum euphorbiae</i>	KX631452.1	16S	CAAATACTGC
18.	https://doi.org/10.1371/journal.pone.0284888	<i>Sitobion avenae</i>	AY745779.1	16S	GCTACCTTTGC
19.	https://doi.org/10.1017/s0007485323000603	<i>Aphis spiraeicola</i>	KC897427.1	16S	TATTACTACC
20.	https://doi.org/10.1371/journal.pone.0017524	<i>Aphis nerii</i>	KC897401.1	16S	CCTCTTTTGGG
21.	https://doi.org/10.3897/zookeys.319.4315	<i>Brachycaudus cardui</i>	JX965979.1	12S	ATTTATAAACC
22.	https://doi.org/10.3897/zookeys.319.4315	<i>Hyperomyzus pallidus</i>	JX965997.1	12S	GTATCTAATCC

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23.	https://doi.org/10.3897/zookeys.319.4318	<i>Idiopterus nephrolepidis</i>	KX631469.1	16S	ATAATTTAAGC
24.	https://doi.org/10.1007/s10886-018-0980-y	<i>Phorodon humuli</i>	JX966008.1	12S	TCTATTCCTGG
25.	https://doi.org/10.1673/031.012.14301	<i>Pterochloroides persicae</i>	PP601230.1	12S	AAATGTACTGG
26.	https://doi.org/10.3390/insects14110862	<i>Sipha maydis</i>	OQ401327.1	18S	TTGAAAGATGC
27.	https://doi.org/10.3390/insects15100816	<i>Aphis glycines</i>	KC897361.1	16S	CCCTCTTTTGG
28.	https://doi.org/10.3390/insects12080744	<i>Aphis nasturtii</i>	KC897399.1	16S	AGTTATCCCCC
29.	https://doi.org/10.3897/zookeys.319.4318	<i>Aulacorthum solani</i>	HG810152.1	16S	TAAATCTTAGG
30.	https://doi.org/10.1038/s41598-018-27933-w	<i>Brachycaudus persicae</i>	JX965981.1	12S	TATTGTAACCC
31.	https://doi.org/10.1155/2013/838145	<i>Capitophorus elaeagni</i>	KX631436.1	16S	AAAATTTAAGC
32.	https://doi.org/10.3390/ijms23137195	<i>Ceratovacuna lanigera</i>	AB035877.1	16S	GATATAAAAGG
33.	https://doi.org/10.1128/JB.186.19.6626-6633.2004	<i>Cinara cedri</i>	CABPRJ01000001.1	5S	TTAGTACTTGG
34.	https://doi.org/10.1371/journal.pone.0012053	<i>Diuraphis muehlei</i>	NC_022727.1	12S	ACATATTGCCC
35.	https://doi.org/10.1186/1471-2148-12-106	<i>Geoica utricularia</i>	PP486353.1	16S	TTACTTTAGGG
36.	https://doi.org/10.1038/s41598-019-46441-z	<i>Lachnus roboris</i>	PP601231.1	12S	TACATATTGCC
37.	https://doi.org/10.1186/s40064-015-1263-5	<i>Pemphigus bursarius</i>	JX966006.1	12S	TTTAAAGAACC
38.	https://doi.org/10.1111/mec.14506	<i>Prociphilus fraxinifolii</i>	AF275220.1	16S	GAAATTAAGG
39.	https://doi.org/10.3390/insects14070639	<i>Rhopalosiphum rufiabdominale</i>	EU358897.1	16S	ATACTAAAACC
40.	https://doi.org/10.3390/insects11080460	<i>Tuberolachnus salignus</i>	AF275246.1	16S	TTAATTAACCC
41.	https://doi.org/10.1016/j.ygeno.2022.110472	<i>Toxoptera aurantii</i>	JX966017.1	12S	TTTATAATAGG
42.	https://doi.org/10.3390/v16060919	<i>Cavariella aegopodii</i>	HG810155.1	16S	ATCTTAGGTGC
43.	https://doi.org/10.1016/j.jinsphys.2015.10.007	<i>Pemphigus betae</i>	U27824.1	18S	ATTTAATGAGC
44.	https://doi.org/10.1016/0042-6822(68)90213-4	<i>Hyperomyzus lactucae</i>	KX631467.1	16S	AATTATTATGC
45.	https://doi.org/10.1093/cz/zox004	<i>Cerataphis brasiliensis</i>	AB301599.1	16S	TTAATTAACC
46.	https://doi.org/10.3390/insects10040109	<i>Hyalopterus amygdali</i>	OK641613.1	12S	GTACATATTGC

47.	https://doi.org/10.3390/insects12020173	<i>Hyalopterus pruni</i>	KC753377.1	ITS1	TTTTGCCTTGC
48.	https://doi.org/10.1673/031.013.8301	<i>Myzus ascalonicus</i>	Y07924.1	ITS1	GTGATCCTTCC
49.	https://doi.org/10.1111/j.1570-7458.2011.01213.x	<i>Myzus varians</i>	KX631439.1	16S	ATACAAGTCCC
50.	https://doi.org/10.1093/jis/5.1.13	<i>Schizolachnus pineti</i>	KP637088.1	ITS2	TTTGCCATCGC
51.	https://doi.org/10.3390/genes12121966	<i>Aphis hederæ</i>	JX965968.1	12S	TTATTGTAACC
52.	https://doi.org/10.1093/jisesa/ieu033	<i>Aphis farinosa</i>	KC897352.1	16S	TAGTTATCCCC
53.	https://doi.org/10.1098/rspb.2008.0679	<i>Brachycaudus tragopogonis</i>	OZ060884.1	16S	GTTACTTTAGG
54.	https://doi.org/10.1038/s41598-019-46441-z	<i>Cavariella theobaldi</i>	OZ060905.1	12S	AATGAAATTGG
55.	https://doi.org/10.3390/insects10100314	<i>Myzus certus</i>	Y07926.1	ITS1	TCTAATGATCC
56.	https://doi.org/10.3390/insects11050282	<i>Pemphigus spyrothecæ</i>	JX966007.1	12S	TAAAAAACAGG
57.	https://doi.org/10.1098/rspb.2004.3033	<i>Sitobion fragariae</i>	JX966013.1	12S	ATTTATTAACC
58.	https://doi.org/10.3390/plants11030244	<i>Tetraneura ulmi</i>	OZ060885.1	16S	AATAAAATTGG
59.	https://doi.org/10.3389/fpls.2024.1441145	<i>Amphorophora idaei</i>	X78807.1	ITS1	TTTCTACGGCC
60.	https://doi.org/10.1371/journal.pone.0184080	<i>Nasonovia ribisnigri</i>	KX631447.1	16S	CTTATCGTCCC
61.	https://doi.org/10.3389/fmicb.2022.961349	<i>Aphis illinoisensis</i>	KC897378.1	16S	GTAGTTATCCC
62.	https://doi.org/10.2903/j.efsa.2024.8657	<i>Anoecia corni</i>	OZ060897.1	16S	TTAATTGTAGG
63.	https://doi.org/10.3390/insects12020173	<i>Aphis sambuci</i>	KC897412.1	16S	CTCTTTGGGC
64.	https://doi.org/10.3390/insects12020173	<i>Chaetosiphon tetraerhodum</i>	KX631472.1	16S	GTTTTATAGGG
65.	https://doi.org/10.1007/s00248-021-01937-y	<i>Myzus ornatus</i>	Y07927.1	ITS1	GTATAACCTGC
66.	https://doi.org/10.3390/insects15090633	<i>Rhopalosiphum nymphææ</i>	JX966010.1	12S	TAATGTAACCC
67.	https://doi.org/10.3897/zookeys.221.3541	<i>Sipha elegans</i>	HM142963.1	18S	GTCCTCATCC
68.	https://doi.org/10.1094/pdis-07-15-0805-re	<i>Uroleucon sonchi</i>	KX631442.1	16S	AGTTTTATAGG
69.	https://doi.org/10.1007/s00248-016-0892-8	<i>Aphis citricidus</i>	MG988610.1	18S	TTAATATACGC
70.	https://doi.org/10.1603/ec13263	<i>Sipha flava</i>	AY745776.1	16S	TTTATTTAACC
71.	https://doi.org/10.2903/j.efsa.2018.5103	<i>Toxoptera citricida</i>	EU358901.1	16S	TTTAATCAACC
PHYLLOXEROIDEA					
72.	https://doi.org/10.1371/journal.pone.0251663	<i>Adelges laricis</i>	AF275215.1	12S	AATAAAATACC
73.	https://doi.org/10.1016/j.foreco.2013.05.047	<i>Adelges tsugæ</i>	KT199045.1	18S	CACCTTAATGC

74.	https://doi.org/10.1038/s41598-020-77928-9	<i>Daktulosphaira vitifoliae</i>	MK685299.1	16S	GAATTTAAAGG
ALEYRODIDAE					
75.	https://doi.org/10.1111/epp.12760	<i>Aleurocanthus camelliae</i>	OQ180914.1	16S	TTTACTGCAGC
76.	https://doi.org/10.3390/insects11010042	<i>Aleurocanthus spiniferus</i>	OQ180915.1	16S	TAATTTACTGC
77.	https://doi.org/10.1080/21658005.2013.795042	<i>Aleurochiton aceris</i>	AY521267.1	16S	TAAAATTTTGG
78.	https://doi.org/10.61310/mndjstea.1015.23	<i>Aleurodicus dispersus</i>	JQ305695.1	16S	TTTCATTGAGC
79.	https://doi.org/10.1016/S0305-0491(99)00054-1	<i>Aleurodicus dugesii</i>	U06474.1	18S	TTAGAACTAGG
80.	https://doi.org/10.3956/2010-05.1	<i>Aleuroplatus coronata</i>	EU441164.1	16S	TGTAAACAGG
81.	https://doi.org/10.3956/2010-05.1	<i>Aleuroplatus gelatinosus</i>	EU441163.1	16S	AAATTTAAGCC
82.	https://doi.org/10.1079/cabicompndium.4538	<i>Aleurothrix floccosus</i>	HG810135.1	16S	TCTGTTGACC
83.	https://doi.org/10.1093/jisesa/ieu136	<i>Aleurotrachelus camelliae</i>	OQ180920.1	16S	TTATTACAACC
84.	https://doi.org/10.1007/s41348-020-00319-9	<i>Aleyrodes proletella</i>	MW644572.1	16S	ATTTACTGCGG
85.	https://doi.org/10.1007/978-3-030-28683-5_8	<i>Bemisia afer</i>	GQ867747.1	16S	AATCATTGAGC
86.	https://doi.org/10.1093/jee/99.3.691	<i>Bemisia argentifolii</i>	AY521257.1	12S	TATCAGATTGC
87.	https://doi.org/10.1007/s13205-021-02831-7	<i>Bemisia breymiae</i>	GQ867745.1	16S	TGTCATTGAGC
88.	https://doi.org/10.1038/s41598-017-00528-7	<i>Bemisia emiliae</i>	GQ867744.1	16S	ATTCATTGAGC
89.	https://doi.org/10.1007/s13205-021-02831-7	<i>Bemisia euphorbiae</i>	GQ867743.1	16S	ATTATGCTACC
90.	https://doi.org/10.1007/s10340-020-01210-0	<i>Bemisia tabaci</i>	AF110722.3	16S	ATTTATTACGC
91.	https://doi.org/10.1007/s12600-023-01059-w	<i>Paraleyrodes bondari</i>	GQ867760.1	16S	TTCATTGAGC
92.	https://doi.org/10.1093/jisesa/ieu136	<i>Pealius mori</i>	HG810145.1	16S	TTGGATTAAGC
93.	https://doi.org/10.5656/KSAE.2012.04.1.83	<i>Pealius rhododendri</i>	GQ867752.1	16S	GTTCATTGAGC
94.	https://doi.org/10.1673/031.010.12001	<i>Siphoninus phillyreae</i>	Z15053.1	18S	GTTAGCTTTGG
95.	https://doi.org/10.5958/0974-8172.2018.00158.X	<i>Tetraleyrodes acaciae</i>	ON311124.1	12S	CCTATAAAAGG

96.	https://doi.org/10.1111/j.1365-2311.2004.00586.x	<i>Tetraleurodes mori</i>	AY521263.1	12S	CACTCTTAAGC
97.	https://doi.org/10.1038/s41598-024-84958-0	<i>Trialeurodes ricini</i>	HG810146.1	16S	ATAAGATTAGG
98.	https://doi.org/10.1093/gbe/evaa216	<i>Aleurolobus barodensis</i>	PQ863114.1	16S	GTAAAAATCGG
COCCOIDEA					
99.	https://doi.org/10.3390/insects11070399	<i>Acanthococcus lagerstroemiae</i>	KJ869290.1	28S	TTTCATTGCGC
100	https://doi.org/10.1093/jisesa/ieae032	<i>Acutaspis scutiformis</i>	KY219127.1	28S	TTCATTACGCC
101	https://doi.org/10.1111/syen.12033	<i>Affirmaspis cederbergensis</i>	MH934019.1	28S	CCATCTTCCCC
102	https://doi.org/10.12681/eh.13916	<i>Anapulvoinaria pistaciae</i>	OR074914.1	5.8S	GTTTGTACAGC
103	https://doi.org/10.11646/zootaxa.4117.1.4	<i>Ancepaspis edentata</i>	KY220051.1	28S	ACCTACTGTCC
104	https://doi.org/10.21608/sjas.2024.322627.146	<i>Aonidiella pini</i>	MK886648.1	28S	ATCAAACAACC
	1				
105	https://doi.org/10.3897/zookeys.867.34937	<i>Aspidaspis florenciae</i>	KY219598.1	28S	ACCATCTTCCC
106	https://doi.org/10.1079/cabicompndium.7490	<i>Aspidiella hartii</i>	KY219906.1	28S	TCCTGAATACC
	90				
107	https://doi.org/10.1079/cabicompndium.7506	<i>Aspidiella sacchari</i>	DQ145368.2	28S	TCCCGTTTACC
108	https://doi.org/10.3897/zookeys.1047.68409	<i>Aspidiotus fularum</i>	MH934073.1	28S	TTTCATTACGC
109	https://doi.org/10.3897/zookeys.1174.105851	<i>Aulacaspis difficilis</i>	DQ145298.2	28S	ATATCAAACGG
110	https://doi.org/10.3897/zookeys.1174.105851	<i>Aulacaspis distylii</i>	DQ145299.2	28S	AGTCTTTTCGCC
111	https://doi.org/10.1111/epp.12778	<i>Aulacaspis rosae</i>	KY219387.1	28S	GCTTACTGTCC
112	https://doi.org/10.1016/S1226-8615(08)60379-9	<i>Aulacaspis spinosa</i>	DQ145367.2	28S	GCAATTCCTCC
	9				
113	https://doi.org/10.11646/zootaxa.4272.1.6	<i>Austrolecanium cryptocaryae</i>	KY816393.1	18S	TTTAATGAGCC
114	https://doi.org/10.11646/zootaxa.4272.1.6	<i>Austrolecanium sassafras</i>	KY816397.1	18S	CAAGTCTTTGC
115	https://doi.org/10.11646/zootaxa.4508.1.6	<i>Austrolichtensia hakearum</i>	MH844461.1	18S	TTTACCCTGTC
116	https://doi.org/10.61310/mjst.v23i1.2370	<i>Ceroplastes floridensis</i>	JQ795604.1	28S	TCCTGAATTCC

117	https://doi.org/10.1007/s13744-016-0480-0	<i>Ceroplastes glomeratus</i>	KX670822.1	28S	TTCAACTTTCC
118	https://doi.org/10.11646/zootaxa.4701.6.2	<i>Ceroplastes kunmingensis</i>	MT316993.1	28S	CTTCATCCTGG
119	https://doi.org/10.11646/zootaxa.4701.6.2	<i>Ceroplastes murrayi</i>	MT316994.1	28S	ACTTTCATTGC
120	https://doi.org/10.1079/pwkb.species.12351 https://doi.org/10.2903/j.efsa.2024.8888	<i>Ceroplastes rubens</i>	MT317009.1	28S	TTCATTGCGCC
121	https://doi.org/10.11609/jott.7419.14.2.20606-20614	<i>Ceroplastes rusci</i>	PV762166.1	28S	CATCTTCCCCC
122	https://doi.org/10.1079/cabicompendium.12353	<i>Ceroplastes sinensis</i>	KY085826.1	28S	GTCCGTTTACC
123	https://doi.org/10.1079/cabicompendium.12372	<i>Ceroplastes stellifer</i>	MK533217.1	28S	TCCGTTTACCC
124	https://doi.org/10.1111/j.1095-8312.2011.01716.x	<i>Chionaspis americana</i>	KY220045.1	28S	TTGAATTCCGC
125	https://doi.org/10.1111/epp.12287	<i>Chionaspis etrusca</i>	DQ145397.2	28S	GATCGATTTCG
126	https://doi.org/10.1590/S1519-566X2010000300013	<i>Coccus alpinus</i>	JX499976.1	28S	AAATTCATCGC
127	https://doi.org/10.1079/cabicompendium.14663	<i>Coccus celatus</i>	MT317016.1	28S	CCATCTTTCGG
128	https://doi.org/10.3897/zookeys.734.22774	<i>Coccus ficicola</i>	MK533218.1	28S	TTACTCCTCGG
129	https://doi.org/10.3897/zookeys.244.4045	<i>Coccus formicarii</i>	MZ782004.1	28S	CCTCGATTACC
130	https://doi.org/10.1017/S0007485300010919	<i>Coccus longulus</i>	MT317024.1	28S	TGACTTCATCC
131	https://doi.org/10.11646/zootaxa.4508.1.6	<i>Cryptes baccatus</i>	MZ782005.1	28S	TATATCGTCGG
132	https://doi.org/10.11646/zootaxa.4508.1.6	<i>Cryptes utzoni</i>	MH886632.1	28S	CATAGTTCACC
133	https://doi.org/10.1080/23802359.2021.1906175	<i>Didesmococcus koreanus</i>	MH844459.1	18S	CATGTATTAGC
134	https://doi.org/10.1093/gigascience/giz113	<i>Ericerus pela</i>	KX380986.1	18S	CCAATTGATCC
135	https://doi.org/10.1603/0022-0493-98.4.1202	<i>Eulecanium cerasorum</i>	MK533231.1	28S	TAGTCTTTCGC
136	https://doi.org/10.1007/s10530-018-1749-5	<i>Nipponaclerda biwakoensis</i>	MZ824101.1	28S	CCACATTTCCC
137	https://doi.org/10.2307/3496360	<i>Planchonia stentae</i>	JX500033.1	28S	GTTTACACAGC
138	https://doi.org/10.21506/j.ponte.2020.1.17	<i>Dactylopius opuntiae</i>	MN310167.1	18S	TTTACTGAGCC
139	https://doi.org/10.53555/jaz.v44iS5.2877	<i>Dactylopius ceylonicus</i>	MN310174.1	18S	ATTTACTGAGC

140	https://doi.org/10.17660/ActaHortic.2022.1343.73	<i>Dactylopius coccus</i>	KJ701995.1	18S	ACAATCTAAGG
141	https://doi.org/10.5897/IJBC2018.1204	<i>Dactylopius tomentosus</i>	MN310135.1	18S	ACCCTGATTCC
142	https://doi.org/10.5281/zenodo.185547	<i>Abgrallaspis aguacatae</i>	GQ478401.1	28S	TACCAACATGC
143	https://doi.org/10.1080/095831500750016389	<i>Abgrallaspis cyanophylli</i>	JQ651047.1	18S	ACTATCTAAGG
144	https://doi.org/10.2298/PIF1602069G	<i>Aonidia lauri</i>	KY219724.1	28S	TAAAGTAACGC
145	https://doi.org/10.28955/alinterizbd.741562	<i>Icerya purchasi</i>	AY426078.1	18S	AACTCTATCGG
146	https://doi.org/10.2903/j.efsa.2014.3929	<i>Aonidiella citrina</i>	GQ325448.1	28S	CCCTGAATTCC
147	https://doi.org/10.1088/1755-1315/1252/1/012007	<i>Aonidiella orientalis</i>	KY219919.1	28S	ATAACGTTCCG
148	https://doi.org/10.13140/RG.2.2.26296.67846	<i>Aspidiotus destructor</i>	JQ650955.1	18S	GTAATTTGCCG
149	https://doi.org/10.1603/AN10060	<i>Aspidiotus nerii</i>	JQ650991.1	18S	TACCCGTTACC
150	https://doi.org/10.2903/j.efsa.2022.7307	<i>Aulacaspis tubercularis</i>	JQ651055.1	18S	TCACTACCTCC
151	https://doi.org/10.1111/1442-1984.12505	<i>Aulacaspis yasumatsui</i>	KX091314.1	28S	TTACTGTCCGC
152	https://doi.org/10.1093/jee/98.5.1603	<i>Chionaspis heterophyllae</i>	GU349114.1	28S	ATCGCAATTCC
153	https://doi.org/10.1603/0046-225X-29.6.1305	<i>Chionaspis pinifoliae</i>	MH032863.1	28S	TCTTGAATTCC
154	https://doi.org/10.4081/jear.2010.147	<i>Chionaspis wistariae</i>	GU349092.1	28S	TTACGCCTTCC
155	https://doi.org/10.1080/00779962.2013.795646	<i>Diaspidiotus perniciosus</i>	JQ650906.1	18S	TCGTCACTACC
156	https://doi.org/10.12741/ebrasilis.v13.e0880	<i>Pinnaaspis strachani</i>	GQ284590.1	18S	ATGATCCTTCC
157	https://doi.org/10.5296/jas.v8i4.17519	<i>Pseudaulacaspis pentagona</i>	HG810175.1	16S	AAATTATTAGG
158	https://doi.org/10.3390/insects11110745	<i>Aspidiotus rigidus</i>	MG940953.1	ITS2	GATACTTCAGC
159	https://doi.org/10.5154/r.inagbi.2021.01.005	<i>Hemiberlesia lataniae</i>	GQ284610.1	ITS2	TCTTTTGACGG
160	https://doi.org/10.4039/tce.2020.4	<i>Eriococcus spurius</i>	AY795540.1	18S	TTTCAGAACGC
161	https://doi.org/10.1016/j.biocontrol.2006.04.009	<i>Cryptococcus fagisuga</i>	DQ125262.1	18S	AACTCAATAGG
162	https://doi.org/10.1515/biol-2021-0066	<i>Marchalina hellenica</i>	KT199030.1	18S	GTTCTTTCCGC

163	https://doi.org/10.1111/jbi.13702	<i>Matsucoccus macrocicatrices</i>	KF053091.1	18S	TTCAGAATCGC
164	https://doi.org/10.1653/0015-4040(2008)91[335:ANEPFF]2.0.CO;2	<i>Crypticeria genistae</i>	EU087718.1	18S	CATTGAGTCC
165	https://doi.org/10.1016/j.jcz.2017.12.004	<i>Drosicha corpulenta</i>	KT199038.1	18S	TTGATCCTCGC
166	http://dx.doi.org/10.17582/journal.pjz/2019.51.5.1815.1822	<i>Drosicha mangiferae</i>	AB523733.1	18S	TTAAAGTGTGC
167	https://doi.org/10.2903/j.efsa.2023.7739	<i>Icerya aegyptiaca</i>	EU087752.1	18S	ATTTGAGTCCC
168	https://doi.org/10.1093/jipm/pmae018	<i>Icerya seychellarum</i>	EU087747.1	18S	CTTAGACATGC
169	https://doi.org/10.1007/s42690-020-00382-7	<i>Antonina graminis</i>	AY426047.1	18S	TTCCTAAATGC
170	https://doi.org/10.9734/ijpps/2024/v36i44477	<i>Dysmicoccus brevipes</i>	AY426037.1	18S	AATCTTTGCGC
171	https://doi.org/10.18520/cs/v128/i9/946-950	<i>Dysmicoccus neobrevipes</i>	KU891794.1	18S	CAAATCTTTGC
172	https://doi.org/10.1093/jee/tow124	<i>Ferrisia gilli</i>	AY426067.1	18S	TCAATTGATCC
173	https://doi.org/10.3390/insects14090720	<i>Planococcus citri</i>	XM_0653453 95.1	5S	GTGTATTCAGC
174	https://doi.org/10.1093/jee/toz125	<i>Pseudococcus longispinus</i>	HG810200.1	16S	AGATTATTACC
175	https://doi.org/10.3390/insects12040343	<i>Pseudococcus calceolariae</i>	MG866178.1	28S	TTCTGAATTCC
176	https://doi.org/10.1371/journal.pone.0157965	<i>Pseudococcus comstocki</i>	KU499441.1	28S	AATATCGAACC
177	https://doi.org/10.1002/ps.6565	<i>Phenacoccus solenopsis</i>	HG810195.1	16S	AGTTTATTACC
178	https://doi.org/10.3390/insects14040345	<i>Pulvinaria hydrangeae</i>	MT317058.1	28S	TTCGATTACCC
179	https://doi.org/10.3390/v13102081	<i>Pulvinaria vitis</i>	OR678175.1	28S	CTTCGATTACC
180	https://doi.org/10.3390/v14122679	<i>Parthenolecanium corni</i>	MK533241.1	28S	TCGTTTACCCC
181	https://doi.org/10.1093/jee/tox170	<i>Parthenolecanium persicae</i>	MK533243.1	28S	TTCGTTTACCC
182	https://doi.org/10.1093/ee/nvaa141	<i>Planococcus ficus</i>	LC583719.1	18S	TCTAAGAACCC
183	https://doi.org/10.1590/1519-6984.237273	<i>Dysmicoccus boninsis</i>	MW542087. 1	28S	TTCCAAGCCC
184	https://doi.org/10.2903/j.efsa.2018.5187	<i>Unaspis citri</i>	KY219855.1	28S	AATATCAAAGG
185	https://doi.org/10.3390/plants13070952	<i>Unaspis yanonensis</i>	KY219678.1	28S	TACTGTCCACC

186	https://doi.org/10.3897/zookeys.309.5318	<i>Lepidosaphes beckii</i>	DQ145352.2	28S	ATTCGTCGCC
187	https://doi.org/10.3897/zookeys.309.5318	<i>Lepidosaphes gloverii</i>	DQ145353.2	28S	TGAATTCGCC
188	https://doi.org/10.2903/j.efs.2022.7024	<i>Maconellicoccus hirsutus</i>	PX279479.1	28S	AACTTTAGCGC
189	https://doi.org/10.3897/zookeys.779.27437	<i>Parlatoria pergandii</i>	DQ145372.2	28S	CACCATCTCC
190	https://doi.org/10.3390/insects16101070	<i>Parlatoria ziziphi</i>	KY219837.1	28S	TGTTAGACTCC
191	https://doi.org/10.3897/zookeys.779.27437	<i>Parlatoria oleae</i>	KY219149.1	28S	TACCAATGACC
192	https://doi.org/10.2903/j.efs.2017.4926	<i>Phenacoccus aceris</i>	KY940032.1	28S	ATTCTGCTGCC
193	https://doi.org/10.3832/ifer0703-006	<i>Physokermes piceae</i>	OQ657453.1	28S	TTCATCCTGGC
194	https://doi.org/10.11646/zootaxa.5195.1.6	<i>Protopulvinaria pyriformis</i>	PV153706.1	28S	TACTTGTCGGC
195	https://doi.org/10.1017/S0007485300015558	<i>Rastrococcus invadens</i>	PX279482.1	28S	CTCTTAAGAGC
196	https://doi.org/10.21608/eajbsa.2009.15438	<i>Saissetia coffeae</i>	HG810170.1	16S	AGATTATGACC
197	https://doi.org/10.3897/zookeys.873.36661	<i>Saissetia oleae</i>	MT276989.1	18S	TAGAACCTACC
198	https://doi.org/10.1007/s12600-018-0678-2	<i>Kermes echinatus</i>	JX436139.1	28S	TTCTAACCGCC
199	https://doi.org/10.2903/j.efs.2024.8666	<i>Eulecanium giganteum</i>	KJ908303.1	28S	GTTTAGTAAGC
200	https://doi.org/10.1007/s12600-024-01175-1	<i>Megapulvinaria maxima</i>	KP189631.1	28S	AATAAAAATCC
201	https://doi.org/10.2903/j.efs.2023.7846	<i>Milviscutulus mangiferae</i>	JX645355.1	28S	TTCCATTCGCC
202	https://doi.org/10.1653/024.097.0302	<i>Parasaissetia nigra</i>	KY933367.1	28S	TCTTTCGCCCC
203	https://doi.org/10.55446/IJE.2021.56	<i>Prococcus acutissimus</i>	KP189525.1	28S	GTTTCGCTATCC
204	https://doi.org/10.1080/09064710.2017.13387	<i>Pulvinaria aurantii</i>	MT317050.1	28S	ACTACTACCCC
205	https://doi.org/10.2903/j.efs.2022.7526	<i>Pulvinaria psidii</i>	JQ651036.1	18S	CTTAATTCGGC
206	https://doi.org/10.3733/hilg.v53n02p027	<i>Pulvinariella mesembryanthe mi</i>	JQ651137.1	18S	ATCTCTACTGG
207	https://doi.org/10.1111/epp.13089	<i>Saissetia miranda</i>	JX866682.1	18S	ACTATCTCTGC
208	https://doi.org/10.2903/j.efs.2023.8000	<i>Takahashia japonica</i>	MK533207.1	18S	ATTTGGCATGC

209	https://doi.org/10.24425/jwld.2025.154265	<i>Aonidiella aurantii</i>	U06475.1	18S	ATTTAAACGGC
210	https://doi.org/10.5281/zenodo.10930744	<i>Eriococcus buxi</i>	AY795513.1	18S	GTAATTTACGC
211	https://doi.org/10.1111/j.1365-3113.1958.tb00403.x https://doi.org/10.36305/2712-7788-2022-4-165-7-16	<i>Ovaticoccus agavium</i>	KT199025.1	18S	CTAATAAGAGC
212	https://doi.org/10.1093/jee/toad184	<i>Thysanococcus pandani</i>	DQ145391.2	28S	TTCCAATGACC
213	https://doi.org/10.18698/2542-1468-2022-2-31-35	<i>Kermes quercus</i>	JX436143.1	28S	ATTCTAACCGC
214	https://doi.org/10.2903/j.efsa.2019.5672	<i>Eumargarodes laingi</i>	KT199035.1	18S	GTAATCATTGC
215	https://doi.org/10.1603/en13004	<i>Eurhizococcus brasiliensis</i>	OK085528.1	18S	AGTAATTGTGG
216	https://doi.org/10.5281/zenodo.4565418	<i>Matsucoccus alabamae</i>	MT621659.1	18S	AATCTATACGC
217	https://doi.org/10.2903/j.efsa.2024.8970	<i>Matsucoccus matsumurae</i>	MW541961.1	18S	CAAATCTATGC
218	https://doi.org/10.1007/BF02371987	<i>Neomargarodes chondrillae</i>	MH051908.1	18S	TTTGAAAGACC
219	https://doi.org/10.7550/rmb.31286	<i>Llaveia axin</i>	HQ893805.1	12S	TTTGATAATGC
220	https://doi.org/10.3958/059.049.0433	<i>Insignorthezia insignis</i>	HQ893803.1	12S	TTATTTTTTGG
221	https://doi.org/10.1016/j.jobaz.2012.02.001	<i>Phoenicococcus marlatti</i>	KT199024.1	18S	CAAGTCATTGC
222	https://doi.org/10.3897/BDJ.2.e1042	<i>Coccidohystrix insolita</i>	MW541948.1	18S	TCCGTATTGCC
223	https://doi.org/10.2903/j.efsa.2021.6928	<i>Crisicoccus pini</i>	HG810185.1	16S	AGATTGTTACC
224	https://doi.org/10.2903/j.efsa.2024.8740	<i>Crisicoccus matsumotoi</i>	KP692254.1	28S	TCCGTTTCCCC
225	https://doi.org/10.1021/acs.jafc.4c05469	<i>Delottococcus aberiae</i>	KP771926.1	28S	CGTCATCTTCC
226	https://doi.org/10.13140/RG.2.2.21810.81609	<i>Delottococcus confusus</i>	KP771927.1	28S	TACACGTCTCC
227	https://doi.org/10.1590/S0085-56262009000100029	<i>Dysmicoccus texensis</i>	KY565032.1	28S	GTCATCTTCCC
228	https://doi.org/10.1093/jee/toy344	<i>Dysmicoccus lepellei</i>	KX015061.1	28S	CTTCGCTTACC
229	https://doi.org/10.46505/IJBI.2021.3112	<i>Ferrisia virgata</i>	MZ264180.1	28S	AACTCTTCAGC
230	https://doi.org/10.1673/2006_06_23.1	<i>Ferrisia malvastra</i>	AY427383.1	28S	AAGATAAAAAGC

231	https://doi.org/10.1038/s42003-022-03956-y	<i>Formicococcus polysperes</i>	MZ920113.1	ITS2	TTTTTTTCGGC
232	https://doi.org/10.1093/jisesa/iew043	<i>Hypogeoecoccus pungens</i>	AY427426.1	28S	CTTCTTTTCC
233	https://doi.org/10.1007/s12600-012-0260-2	<i>Nipaecoccus nipae</i>	AY427421.1	28S	TCCATTCATGC
234	https://doi.org/10.1021/acs.jafc.0c07543	<i>Nipaecoccus viridis</i>	AY427393.1	28S	TTTTCCAAGCC
235	https://doi.org/10.1007/s10584-017-1917-0	<i>Oracella acuta</i>	JF965418.1	28S	TTTCGCAGTCC
236	https://doi.org/10.4001/003.018.0207	<i>Paracoccus burnerae</i>	AY426076.1	18S	TCCATTGATCC
237	https://doi.org/10.2903/j.efsa.2023.7899	<i>Paracoccus marginatus</i>	AY427410.1	28S	TCTTCCCCGC
238	https://doi.org/10.1371/journal.pone.0047675	<i>Phenacoccus manihoti</i>	KY271371.1	28S	CTCTGAATTCC
239	https://doi.org/10.1111/epp.12109	<i>Phenacoccus madeirensis</i>	AY427389.1	28S	TCTCGTAATCC
240	https://doi.org/10.24154/jhs.v7i1.405	<i>Phenacoccus parvus</i>	MW542039.1	28S	CCTTTAGTACC
241	https://doi.org/10.13140/2.1.4362.0165	<i>Phenacoccus peruvianus</i>	JF714177.1	28S	ATTAACGTACC
242	https://doi.org/10.1303/aez.2006.573	<i>Phenacoccus solani</i>	KJ620514.1	28S	CTCGTTAATCC
243	https://doi.org/10.1007/s13355-016-0452-1	<i>Planococcus kraunthiae</i>	MW542110.1	28S	AAGTAAATAGG
244	https://doi.org/10.3389/fpls.2022.1016737	<i>Planococcus lilacinus</i>	KP692405.1	28S	TTACACGTACC
245	https://doi.org/10.1603/ec12097	<i>Planococcus minor</i>	JF965414.1	28S	CTTCTTCCCC
246	https://doi.org/10.2298/PIF1401067G	<i>Planococcus vovae</i>	OR536427.1	28S	TAGTTTCTCGG
PSYLLOIDEA					
247	https://doi.org/10.1080/00222939100770791	<i>Aphalaroida inermis</i>	MG988580.1	18S	CACAGTTATCC
248	https://doi.org/10.1080/00779962.2007.9722151	<i>Arytainilla spartiophila</i>	MG988581.1	18S	AACCCTAATCC
249	https://doi.org/10.11646/zootaxa.3646.2.2	<i>Cornopsylla rotundiconis</i>	MH758086.1	28S	TGCCCTTTTGC
250	https://doi.org/10.1111/jen.12937	<i>Diaphorina communis</i>	MH042733.1	16S	GCTGTTATCCC
251	https://doi.org/10.1111/j.1440-6055.1976.tb01714.x	<i>Acizzia dodonaeae</i>	MG195297.1	18S	CTAATAAAAGC

252	https://doi.org/10.1371/journal.pone.0214220	<i>Acizzia errabunda</i>	MG195288.1	18S	CTAGAATTACC
253	https://doi.org/10.13140/RG.2.2.22942.72008	<i>Acizzia sasakii</i>	MK039563.1	16S	ATTTCTCTCC
254	https://doi.org/10.11646/zootaxa.4362.1.4	<i>Cacopsylla bidens</i>	MK039580.1	16S	TCATACAAGCC
255	https://doi.org/10.3897/BDJ.10.e85094	<i>Cacopsylla burckhardti</i>	MK039571.1	16S	ATAAAACACGC
256	https://doi.org/10.11646/zootaxa.4362.1.4	<i>Cacopsylla chinensis</i>	LC513963.1	16S	TCTTATCGTCC
257	https://doi.org/10.1080/23802359.2021.1875908	<i>Cacopsylla citrisuga</i>	MH053225.1	16S	ACTATCACCCC
258	https://doi.org/10.1186/s12866-020-01895-4	<i>Cacopsylla heterogena</i>	MH053234.1	16S	AAAAATTATGC
259	https://doi.org/10.3390/agronomy13112710	<i>Cacopsylla jukyungi</i>	LC513968.1	16S	AATTCTATAGG
260	https://doi.org/10.5281/zenodo.14578	<i>Cacopsylla mali</i>	AF367822.1	12S	GATAAAATACC
261	https://doi.org/10.5281/zenodo.14578	<i>Cacopsylla peregrina</i>	MT038953.1	28S	TGCTTAAATCC
262	https://doi.org/10.34101/actaagrar/74/1660	<i>Cacopsylla pruni</i>	DQ778635.1	18S	GTACTCATCC
263	https://doi.org/10.5281/zenodo.5806004	<i>Cacopsylla pulchra</i>	MT038955.1	28S	TATTAATATGC
264	https://doi.org/10.3390/agronomy14040668	<i>Cacopsylla pyri</i>	MK039584.1	16S	AAATTATAAGG
265	https://doi.org/10.11646/zootaxa.4362.1.4	<i>Cacopsylla pyricola</i>	MK039589.1	16S	TCTGTTCAACC
266	https://doi.org/10.11646/zootaxa.4362.1.4	<i>Cacopsylla pyrisuga</i>	AB721006.1	16S	ACATTTTCCCC
267	https://doi.org/10.5281/zenodo.14578	<i>Cacopsylla ulmi</i>	MT038960.1	28S	TTAAATCCACC
268	https://doi.org/37.10.5281/zenodo.5806004	<i>Livilla horvathi</i>	AF367826.1	12S	CTTTTAAATCC
269	http://dx.doi.org/10.5252/z2015n1a13	<i>Livilla pyrenaica</i>	AF367832.1	12S	TTAATAATCC
270	https://doi.org/10.4289/0013-8797.119.1.162	<i>Livilla variegata</i>	AF367837.1	12S	ATCCTATTCC
271	https://doi.org/10.13140/RG.2.2.14711.39848	<i>Psylla alni</i>	MG988605.1	18S	ACTTTGCTTGC
272	https://doi.org/10.13140/RG.2.2.14711.39848	<i>Psylla alniformosanaes uga</i>	MH758107.1	28S	GGTATTTACC
273	https://doi.org/10.1111/epp.12636	<i>Psylla buxi</i>	MG988606.1	18S	CTTTTACTTCC
274	https://doi.org/37.10.5281/zenodo.5806004	<i>Psylla foersteri</i>	MG988583.1	18S	AATACGAATGC
275	https://doi.org/10.3897/travaux.66.e98619	<i>Spanioneura fonscolombii</i>	MG988609.1	18S	ATCAAGTTTGG
276	https://doi.org/10.21203/rs.3.rs-1641424/v1	<i>Bactericera cockerelli</i>	MW804913.1	18S	AATTTGCGTGC
277	https://doi.org/10.2903/j.efsa.2021.6357	<i>Diaphorina citri</i>	MG997020.1	16S	TTGGTATGTCC
278	https://doi.org/10.3389/fpls.2022.1089762	<i>Trioza erytrae</i>	MT416551.1	12S	GTAAATTTACC

279	https://doi.org/10.3897/zookeys.319.4316	<i>Livia junci</i>	NC_038137.1	16S	TAATTTTATGC
280	https://doi.org/10.3390/insects15010019	<i>Bactericera gobica</i>	MH757801.1	18S	TACGCTATTGG
281	https://doi.org/10.3844/ajabssp.2008.686.688	<i>Bactericera tremblayi</i>	MT038925.1	5.8S	TTCGACTTGCC
282	https://doi.org/10.1111/eea.12565	<i>Bactericera trigonica</i>	MT038942.1	ITS2	TTTGAATAGC
283	https://doi.org/10.1371/journal.pone.0257031	<i>Trioza eugeniae</i>	U06482.1	18S	AAATTGCAAGC
284	https://doi.org/10.1371/journal.pone.0257031	<i>Trioza adventicia</i>	MG195401.1	18S	CTTGTA AAAAGG
HETEROPTERA					
285	https://doi.org/10.1093/ismejo/wrae097	<i>Nezara viridula</i>	AB020419.1	16S	GATTTAAGTGC
286	https://doi.org/10.1371/journal.pone.0108746	<i>Oncopeltus fasciatus</i>	LN623664.1	28S	GTTTTCCACCC
287	https://doi.org/10.3390/insects14110843	<i>Pyrrhocoris apterus</i>	KX821803.1	12S	GTAAAATTACC
288	https://doi.org/10.3897/BDJ.7.e36453	<i>Acanthocoris sordidus</i>	AB240575.1	16S	TAATACCATGG
289	https://doi.org/10.1073/pnas.1202111109	<i>Lygaeus kalmii</i>	KC425216.1	18S	GTTCTCATTC
290	https://doi.org/10.3390/insects10060167	<i>Apolygus lucorum</i>	KU049703.1	16S	TAAATCATAGG
291	https://doi.org/10.1371/journal.pone.0059000	<i>Adelphocoris lineolatus</i>	KJ461200.1	18S	GTTTACTGAGC
292	https://doi.org/10.4269/ajtmh.2012.11-0237	<i>Triatoma infestans</i>	MW893248.1	16S	TAAACAAAAGG
293	https://doi.org/10.3390/insects13060511	<i>Riptortus pedestris</i>	GU145271.1	16S	CCTTTCATACC
294	https://doi.org/10.1264/jsme2.ME19011	<i>Coreus marginatus</i>	MW845175.1	12S	AATCTCTATGC
295	https://doi.org/10.3390/insects12090807	<i>Lygus lineolaris</i>	KP230905.1	28S	TGAATCTCCCC
296	https://doi.org/10.1673/031.011.13801	<i>Eurygaster integriceps</i>	KP890857.1	18S	CCAATAGATCC
297	https://doi.org/10.1673/031.013.5001	<i>Aelia acuminata</i>	MT265584.1	18S	TTTAAGTCAGC
298	https://doi.org/10.1093/jisesa/ieae025	<i>Dolycoris baccarum</i>	JQ029133.1	12S	TAATAATAGGG
299	https://doi.org/10.1038/s41598-023-37705-w	<i>Eurydema ventralis</i>	MT265521.1	28S	GTTTTACACCC
300	https://doi.org/10.1038/s41598-023-37705-w	<i>Eurydema oleracea</i>	NC_044764.1	12S	TAATTTCTAGG
301	https://doi.org/10.2903/j.efsa.2022.7091	<i>Bagrada hilaris</i>	OP168132.1	16S	AATGATTATGC
302	https://doi.org/10.1371/journal.pone.0152205	<i>Corythucha ciliata</i>	MZ241573.1	18S	GATTGTGTTGC

303	https://doi.org/10.3390/insects11020129	<i>Stephanitis pyri</i>	KF661826.1	28S	TTGTAACACCC
304	https://doi.org/10.1264/jsme2.ME22042	<i>Leptoglossus occidentalis</i>	ON331774.1	18S	GCTTTTAAACC
305	https://doi.org/10.3390/insects10100333	<i>Leptoglossus zonatus</i>	KF057195.1	28S	GTTGTATTAGC
306	https://doi.org/10.1093/jisesa/iey021	<i>Anasa tristis</i>	MW883642.1	16S	AAATCTAAAGG
307	https://doi.org/10.1038/s41598-022-16295-z	<i>Nezara antennata</i>	MT265637.1	18S	AAACTATGACC
308	https://doi.org/10.3389/fpls.2022.804839	<i>Piezodorus guildinii</i>	JX425419.1	16S	TTCATACAAGC
309	https://doi.org/10.3897/BDJ.7.e36453	<i>Taylorilygus apicalis</i>	MH432249.1	28S	TTTTGACACCC
310	https://doi.org/10.1002/ece3.510	<i>Creontiades dilutus</i>	NC_030257.1	12S	AGATTTATTGG
311	https://doi.org/10.1080/09670874.2017.1403059	<i>Graphosoma lineatum</i>	U88339.1	18S	TAACTACTGGC
312	https://doi.org/10.1111/jen.13206	<i>Palomena prasina</i>	JQ029154.1	16S	CTCATTCAACC
313	https://doi.org/10.55446/IJE.2022.805	<i>Eurydema dominulus</i>	KC155935.1	16S	CTCTCTCATCC
314	https://doi.org/10.1038/s41598-023-37705-w	<i>Eurydema ornata</i>	MT265620.1	18S	TGCCTGTTACC
315	https://doi.org/10.15835/hpm.v31i1-2.14746	<i>Oxycarenus lavaterae</i>	LN623676.1	28S	CTCTCTGATCC
316	https://doi.org/10.5073/JABFQ.2015.088.003	<i>Eurygaster maura</i>	JQ029150.1	16S	CGCTGTTATCC
317	https://doi.org/10.17660/ActaHortic.2014.1052.38	<i>Gonocerus acuteargulatus</i>	MW845231.1	12S	TATATAACACC
318	https://doi.org/10.1155/2012/435640	<i>Trigonotylus caelestialium</i>	MZ241805.1	28S	CTGTCTTAAGC
319	https://doi.org/10.1080/09583157.2020.1828279	<i>Dicyphus errans</i>	KY274682.1	16S	AAAATTATAGG
320	https://doi.org/10.1080/23802359.2019.1674732	<i>Cletus punctiger</i>	AY627323.1	18S	TCAATAGTACC
321	https://doi.org/10.21203/rs.3.rs-4239869/v1	<i>Apolygus spinolae</i>	GU194615.1	18S	TCATCGATACC
322	https://doi.org/10.1088/1755-1315/913/1/012012	<i>Riptortus linearis</i>	AY665547.1	18S	ACATACTTGGC
323	https://doi.org/10.1002/ps.5518	<i>Pseudatomoscelis seriatus</i>	OR229249.1	28S	TTCAGCTTTCG
324	https://doi.org/10.3897/neobiota.90.113421	<i>Halymorpha halys</i>	KF273403.1	28S	ATCTCTGATCC

325	https://doi.org/10.18474/0749-8004-44.1.1	<i>Acrosternum hilare</i>	MK648451.1	16S	TAAGCTTCTGC
326	https://doi.org/10.1002/ps.6821	<i>Dichelops furcatus</i>	KU853750.1	28S	CACTTTTAAGC
327	https://doi.org/10.1007/s10886-012-0144-4	<i>Edessa meditabunda</i>	KF035964.1	16S	TCTATAAATCC
328	https://doi.org/10.18016/ksutarimdogo.vi.1388051	<i>Aelia rostrata</i>	MT265398.1	16S	AATTTTAAAGG
329	https://doi.org/10.1007/s10340-021-01445-5	<i>Oebalus ypsilongriseus</i>	KC537028.1	16S	AATTTTAATCC
330	https://doi.org/10.1590/S1519-566X2007000600022	<i>Arvelius albopunctatus</i>	MT073065.1	18S	TTTAATTCAGC
331	https://doi.org/10.1002/ps.8854	<i>Brachyplatys subaeneus</i>	KY495723.1	28S	TTAAATTCGGC
332	https://doi.org/10.1303/jjaez.2003.159	<i>Plautia crossota</i>	HQ630645.1	18S	CTGCTTTAAGC
333	https://doi.org/10.1303/jjaez.2021.13	<i>Plautia stali</i>	LC007117.1	16S	ATTAAATTACC
334	https://doi.org/10.1093/jee/toad177	<i>Leptoglossus clypealis</i>	MW845137. 1	12S	ACCAATCAACC
335	https://doi.org/10.4039/Ent128777-4	<i>Leptoglossus corculus</i>	MW838831. 1	28S	TCCCTTTCGCC
336	https://doi.org/10.1093/aesa/83.4.753	<i>Leptoglossus fulvicornis</i>	MW838585. 1	18S	ATTTAAGAGCC
337	https://doi.org/10.3958/0147-1724-33.2.161	<i>Leptoglossus phyllopus</i>	MW838836. 1	28S	ACAACTCTCCC
338	https://doi.org/10.1603/AN13084	<i>Narnia femorata</i>	MG490147.1	18S	GATATGTCACC
339	https://doi.org/10.1590/S0103-84782001000300003	<i>Phthiacnemia picta</i>	KC537014.1	16S	CTATCTAAAGG
340	https://doi.org/10.32473/EDIS-IN582-2003	<i>Spartocera batatas</i>	MW838671. 1	18S	ATTGATAGCC
341	https://doi.org/10.5281/zenodo.8368595	<i>Arocatus longiceps</i>	LN623643.1	28S	CTCAAACCTCCC
342	https://doi.org/10.21661/r-471192	<i>Arocatus melanocephalus</i>	KJ461273.1	18S	TAGTTAATAGG
343	https://doi.org/10.21661/r-117698	<i>Kleidocerys resedae</i>	LN623655.1	28S	ATCCTCCCTCC
344	https://doi.org/10.1038/srep11042	<i>Adelphocoris suturalis</i>	GU194529.1	16S	AAATTTAAAGG
345	https://doi.org/10.1007/s10340-009-0277-6	<i>Closterotomus trivialis</i>	MF667144.1	28S	GTTTTGACACC
346	https://doi.org/10.1007/s10340-016-0765-4	<i>Campylomma verbasci</i>	KF273138.1	28S	ATATGGACCC
347	https://doi.org/10.3923/je.2007.324.330	<i>Lygus elisus</i>	AF473541.1	16S	AGAAAGTTTGC

348	https://doi.org/10.1002/ps.6303	<i>Lygus rugulipennis</i>	GU194565.1	16S	TCTTATTATCC
349	https://doi.org/10.1093/jee/toz340	<i>Euschistus heros</i>	KY440164.1	18S	TTGTCACTACC
350	https://doi.org/10.1007/s13744-019-00706-4	<i>Thyanta perditor</i>	MT265670.1	18S	CATATATCCGG
351	https://doi.org/10.1590/s1519-69842006000300010	<i>Oebalus poecilus</i>	KC796346.1	28S	CTTCATTGCCG
352	https://doi.org/10.1016/j.jinsphys.2020.104038	<i>Lygus hesperus</i>	KP231017.1	28S	CGAATAAATCC
353	https://doi.org/10.3390/insects15100762	<i>Lygus pratensis</i>	NC_037926.1	12S	AGATCTATTGG
354	https://doi.org/10.1038/s41598-025-95657-9	<i>Corythucha marmorata</i>	KF661732.1	16S	TTATCATAGGG
355	https://doi.org/10.1603/en11323	<i>Stephanitis takeyai</i>	KF661808.1	28S	TTTGTAACACC
356	https://doi.org/10.1079/cabicompndium.30340	<i>Leptoglossus gonagra</i>	MW845149.1	12S	TTAATTCACCC
357	https://doi.org/10.1017/s1431927619015010	<i>Scaptocoris castanea</i>	MG253280.1	16S	CTAAATTGACC
358	https://doi.org/10.3390/insects14030237	<i>Megacopta cribraria</i>	AB240165.1	16S	ATAATATAAGC
359	https://doi.org/10.1017/s0007485318000950	<i>Creontiades pacificus</i>	KC852033.1	28S	CATTTGATACC
360	https://doi.org/10.1603/en11032	<i>Stenotus rubrovittatus</i>	GU194680.1	18S	AGATTTTCAGCC
361	https://doi.org/10.1002/ps.6797	<i>Teleonemia scrupulosa</i>	KF661827.1	28S	TTTGTAACGCC
AUCHENORRHYNCHA					
362	https://doi.org/10.2903/j.efsa.2017.5037	<i>Hishimonus phycitis</i>	MT981712.1	16S	TAATTATGTCC
363	https://doi.org/10.3389/fmicb.2023.1162113	<i>Nilaparvata lugens</i>	AF158034.1	16S	AATATAATACC
364	https://doi.org/10.1002/arch.21992	<i>Laodelphax striatellus</i>	PQ500564.1	18S	CTTAATGTGGC
365	https://doi.org/10.7717/peerj.9320	<i>Sogatella furcifera</i>	HM017358.1	28S	CTACTACCACC
366	https://doi.org/10.3390/ijms221910696	<i>Nephotettix cincticeps</i>	AY830909.1	16S	TATCTTAATCC
367	https://doi.org/10.1088/1755-1315/807/2/022107	<i>Nephotettix virescens</i>	KR230142.1	28S	TTTTCTATCGG
368	https://doi.org/10.3390/v16081305	<i>Empoasca fabae</i>	AF304640.1	28S	ATTAGATTAGG
369	https://doi.org/10.1002/ps.8659	<i>Amrasca biguttula</i>	PP853663.1	12S	AATAAAAGAGC

370	https://doi.org/10.1127/entomologia/2020/0977	<i>Scaphoideus titanus</i>	MT345578.1	16S	ATATGAACTCC
371	https://doi.org/10.1603/en10115	<i>Homalodisca vitripennis</i>	AY869803.1	16S	GTAATTCTGC
372	https://doi.org/10.1128/AEM.01464-15	<i>Macrosteles quadrilineatus</i>	AF051288.1	12S	TACTATTCAGG
373	https://doi.org/10.1094/pdis-10-15-1189-re	<i>Circulifer tenellus</i>	LC670614.1	28S	AATTCATTGC
374	https://doi.org/10.1002/ps.6842	<i>Dalbulus maidis</i>	AF051283.1	12S	TAATAATACC
375	https://doi.org/10.4137/IJIS.S13029	<i>Cofana spectra</i>	GQ122082.1	16S	GAAAATCTACC
376	https://doi.org/10.3791/62417	<i>Peregrinus maidis</i>	HM017225.1	18S	ACTAAGATCCC
377	https://doi.org/10.1046/j.1440-6055.2002.00268.x	<i>Idioscopus clypealis</i>	KX268303.1	28S	TTACCACCTGC
378	https://doi.org/10.3390/insects14090734	<i>Maiestas dorsalis</i>	MT988057.1	28S	AGTTTACCACC
379	https://doi.org/10.3390/insects11020080	<i>Spissistilus festinus</i>	AF183246.1	28S	TCCATCTAAGG
380	https://doi.org/10.46429/jaupr.v57i4.10729	<i>Umbonia crassicornis</i>	AF187463.1	28S	TCTGTGAAACC
381	https://doi.org/10.1590/0103-8478cr20170152	<i>Quesada gigas</i>	MG953135.1	18S	TTATGACTCGC
382	https://doi.org/10.1128/mra.00446-22	<i>Exitianus exitiosus</i>	L13018.1	16S	AAGAATTCTGC
383	https://doi.org/10.1093/jee/tov063	<i>Empoasca vitis</i>	JQ886745.1	16S	TAATCATTGGG
384	https://doi.org/10.1111/epp.12610	<i>Philaenus spumarius</i>	AY744779.1	18S	CATCTTTCCGG
385	https://doi.org/10.3390/insects12040340	<i>Poophilus costalis</i>	GQ405992.1	18S	CTTAATTTGGC
386	https://doi.org/10.1007/s00203-003-0630-8	<i>Dalbulus elimatus</i>	KU722545.1	16S	TGTCTCAGTCC
387	https://doi.org/10.1002/jmor.1051720310	<i>Macrosteles fascifrons</i>	L12998.1	16S	TATCATTGGGC
388	https://doi.org/10.3390/insects15040296	<i>Empoasca flavescens</i>	AY830906.1	28S	CACTATCAAGC
389	https://doi.org/10.1016/j.phytochem.2021.112848	<i>Neophilaenus campestris</i>	KP410336.1	ITS2	TTTACCGAACC
390	https://doi.org/10.1080/23802359.2021.1911705	<i>Stictocephala bisonia</i>	PV207583.1	12S	CCTATTTTAGG
391	https://doi.org/10.1094/pdis.2003.87.10.1255	<i>Homalodisca coagulata</i>	AY875213.1	28S	TGAAATAATGC
392	https://doi.org/10.3390/insects11060345	<i>Metcalfa pruinosa</i>	KX702853.1	18S	TTGTACGATCC

393	https://doi.org/10.2903/j.efsa.2020.6224	<i>Haplaxius crudus</i>	HM017369.1	28S	ATTTTCAGGGC
394	https://doi.org/10.1038/s41598-020-70150-7	<i>Ommatissus lybicus</i>	KP822941.1	28S	TGAATCTCTCC
THYSANOPTERA					
395	https://doi.org/10.1017/S0007485319000762	<i>Thrips tabaci</i>	AB904212.1	ITS1	CACCTTTCCCC
396	https://doi.org/10.1371/journal.pone.0199404	<i>Thrips palmi</i>	OR350842.1	ITS2	ATATATGATCC
397	https://doi.org/10.1515/aeuc-2016-0005	<i>Thrips simplex</i>	KM877312.1	ITS2	TCTTAGTGACC
398	https://doi.org/10.1111/j.1365-2338.2008.01201.x	<i>Thrips hawaiiensis</i>	AB904201.1	ITS1	GTTTTGTACGG
399	https://doi.org/10.3390/insects12060502	<i>Thrips flavus</i>	AM932174.1	ITS2	TGTAAACACC
400	https://doi.org/10.1303/jjaez.2014.275	<i>Thrips nigropilosus</i>	AM932193.1	ITS2	TTGATCCAACC
401	https://doi.org/10.18520/cs/v122/i2/211-213	<i>Thrips parvoispinus</i>	OR141114.1	18S	TATCTGATCGC
402	https://doi.org/10.1093/jipm/pmab045	<i>Frankliniella fusca</i>	AB972997.1	ITS2	AATCTCGTCC
403	https://doi.org/10.3390/insects13060493	<i>Frankliniella insularis</i>	GU980274.1	28S	TCTTCCCAAGC
404	https://doi.org/10.3390/insects14070643	<i>Frankliniella occidentalis</i>	AJ308591.1	ITS2	GTTTCGTCCTCC
405	https://doi.org/10.1653/024.097.0206	<i>Frankliniella schultzei</i>	GQ343259.1	ITS1	TTTTTTAAGGC
406	https://doi.org/10.32473/edis-in1236-2019	<i>Frankliniella tritici</i>	AB973010.1	ITS2	TTAAGAGTACC
407	https://doi.org/10.1093/jisesa/iey028	<i>Scirtothrips aurantii</i>	DQ075048.1	ITS1	AGTTTTTACGG
408	https://doi.org/10.1371/journal.pone.0123747	<i>Scirtothrips dorsalis</i>	DQ075059.1	ITS1	CTGAATTCCCC
409	https://doi.org/10.1079/BER2002169	<i>Scirtothrips perseae</i>	DQ075029.1	ITS2	CAATCTCGTCC
410	https://doi.org/10.1111/afe.12233	<i>Anaphothrips obscurus</i>	AB973073.1	ITS2	AATTATATTGG
411	https://doi.org/10.1038/s41598-025-98466-2	<i>Fulmekiola serrata</i>	KC505476.1	16S	TTTCGATTGG
412	https://doi.org/10.33338/ef.84532	<i>Limothrips denticornis</i>	KT204371.1	18S	ATTACCTCTGG
413	https://doi.org/10.1038/s41597-023-02164-5	<i>Megalurothrips usitatus</i>	AB904185.1	ITS1	TCGGACTTTCC
414	https://doi.org/10.1603/en13002	<i>Pezothrips kellyanus</i>	KC513094.1	28S	TTCAATGTCC
415	https://doi.org/10.14719/pst.5230	<i>Pseudodendrothrips mori</i>	KC513000.1	18S	GTCATCTTCC

416	https://doi.org/10.32473/edis-IN1364-2022	<i>Caliothrips fasciatus</i>	JQ609601.1	28S	AACAATAAAGC
417	https://doi.org/10.25100/socolen.v50i1.13135	<i>Caliothrips phaseoli</i>	AB972981.1	28S	GTTTCTTTTCC
418	https://doi.org/10.1093/ee/nvac021	<i>Heliothrips haemorrhoidalis</i>	KC512969.1	18S	GTCAACTTCCC
419	https://doi.org/10.1007/s41348-023-00751-7	<i>Hercinothrips femoralis</i>	AJ308596.1	28S	ATTGTTTTTGG
420	https://doi.org/10.1079/cabicompndium.62325634	<i>Thrips setosus</i>	AB277570.1	28S	TTTCGTAAGCC
421	https://doi.org/10.2903/j.efsa.2018.5189	<i>Scirtothrips citri</i>	KX610660.1	28S	CATGAATCTCC
422	https://doi.org/10.3390/insects13010061	<i>Mycterothrips glycines</i>	HM246165.1	16S	CTTCTTTAGG
423	https://doi.org/10.1080/23802359.2023.2169572	<i>Stenchaetothrips biformis</i>	KC513010.1	18S	CTTGCACTTGC
424	https://doi.org/10.1002/arch.22086	<i>Aptinothrips stylifer</i>	KJ436475.1	28S	CTATACTCAGC
425	https://doi.org/10.3390/insects13010061	<i>Frankliniella tenuicornis</i>	KM886245.1	ITS1	TGCTTGTTAGC
426	https://doi.org/10.1093/jee/toy237	<i>Frankliniella williamsi</i>	AB904183.1	ITS1	TTTGCTTTCGC
427	https://doi.org/10.3390/insects15090699	<i>Thrips fuscipennis</i>	AB904198.1	ITS1	TTTTGTACGGG
428	https://doi.org/10.30843/nzpp.2008.61.6856	<i>Thrips major</i>	KM877309.1	ITS2	TACGGTATACC
429	https://doi.org/10.3897/zookeys.330.5939	<i>Thrips physapus</i>	AB973055.1	ITS2	TCACAGTTTTGG
430	https://doi.org/10.3897/zookeys.504.9576	<i>Thrips trehernei</i>	KM877313.1	ITS2	ATTGCAATCGC
431	https://doi.org/10.3897/zookeys.504.9576	<i>Thrips vulgatissimus</i>	AB973064.1	ITS2	CTTGTCATCGC
432	https://doi.org/10.3897/zookeys.549.6889	<i>Selenothrips rubrocinctus</i>	KC513107.1	28S	CAATGACTTGC
433	https://doi.org/10.2903/j.efsa.2022.7337	<i>Microcephalothrips abdominalis</i>	AB904191.1	18S	GGTCATCTTCC
434	https://doi.org/10.1673/031.006.4501	<i>Frankliniella cephalica</i>	AB904174.1	18S	CATTCAATCGG
435	https://doi.org/10.1093/jisesa/ieu167	<i>Frankliniella intonsa</i>	LC662016.1	ITS2	TCTCTATACGG
436	https://doi.org/10.3390/toxins14070502	<i>Limothrips cerealium</i>	AJ308593.1	ITS2	TCTAAAACGC
437	https://doi.org/10.1371/journal.pone.0276865	<i>Frankliniella gardeniae</i>	KY605027.1	28S	CCGTTTACACC
438	https://doi.org/10.3390/insects13010061	<i>Parthenothrips dracaenae</i>	AJ308595.1	ITS2	TTTCAAATGGG

439	https://doi.org/10.1093/jisesa/ieu135	<i>Gynaikothrips uzeli</i>	MK940484.1	16S	TATTTTAAACC
440	https://doi.org/10.3390/insects11120887	<i>Gynaikothrips ficorum</i>	KC513064.1	28S	ATTAATATGCC
441	https://doi.org/10.3390/insects15030211	<i>Echinothrips americanus</i>	AB972994.1	5.8S	TTCATCGACCC
442	https://doi.org/10.3390/insects15090699	<i>Thrips australis</i>	KC513117.1	28S	CTACATTGCC
443	https://doi.org/10.1038/s41598-024-63985-x	<i>Taeniothrips inconsequens</i>	KC513112.1	28S	TTTTCTCC
444	https://doi.org/10.3390/insects13010061	<i>Dendrothrips ornatus</i>	PX262664.1	16S	AATCCTATCGG
445	https://doi.org/10.3390/insects13010061	<i>Rhipiphorothrips cruentatus</i>	MN072396.1	16S	TAGTTAAACCC
446	https://doi.org/10.1093/jisesa/ieae086	<i>Dictyothrips betae</i>	EU704684.1	28S	TTAGGTTTCGC
447	https://doi.org/10.3390/insects13010061	<i>Sericothrips staphylinus</i>	KC513108.1	28S	CTTTCTCC
448	https://doi.org/10.3390/insects13010061	<i>Aptinothrips rufus</i>	AB972972.1	5.8S	CTTCATCGACC
449	https://doi.org/10.3390/insects13010061	<i>Anaphothrips sudanensis</i>	AB973066.1	ITS2	ATTTATATTGG
450	https://doi.org/10.1016/j.compag.2022.10746	<i>Thrips imaginis</i>	AB775432.1	5.8S	CATTCGCTGC
451	https://doi.org/10.3390/insects13080670	<i>Thrips brevicornis</i>	NC_087731.1	16S	CAAATGTTTGG
452	https://doi.org/10.33936/latecnica.v13i2.4640	<i>Chaetanaphothrips signipennis</i>	MK056207.1	18S	AGTTTGACACC
453	https://doi.org/10.1093/jee/toaa311	<i>Frankliniella bispinosa</i>	GU980272.1	28S	GTAATCTCACC
TETRANYCHIDAE					
454	https://doi.org/10.1016/j.ijbiomac.2024.13898	<i>Amphitetranynchus viennensis</i>	AB926293.1	18S	AAGGAATATCC
455	https://doi.org/10.11158/saa.3.1.8	<i>Aponychus corpuzae</i>	AB926233.1	18S	ATGTAAATTGG
456	https://doi.org/10.1093/jee/toz294	<i>Bryobia praetiosa</i>	AB926228.1	18S	GGTTTTTGTC
457	https://doi.org/10.13140/RG.2.1.3259.6967	<i>Bryobia rubrioculus</i>	MW530361.1	ITS2	TGATACTCCCC
458	https://doi.org/10.1023/A:1021116121604	<i>Eotetranychus asiaticus</i>	AB926259.1	18S	ATGGAATATCC
459	https://doi.org/10.1603/EC12304	<i>Eotetranychus lewisi</i>	JF774172.1	ITS2	TGTTTCTCAGG

460	https://doi.org/10.1023/A:1021185112192	<i>Eutetranychus pruni</i>	AB926356.1	28S	TATGCTACACC
461	https://doi.org/10.4067/S0718-58392021000200228	<i>Eutetranychus africanus</i>	AB926232.1	18S	AATTACAATGC
462	https://doi.org/10.24349/pv5i-1hqj	<i>Eutetranychus banksi</i>	KP642050.1	5.8S	ATTATCGTAGC
463	https://doi.org/10.1007/s10493-011-9476-y	<i>Eutetranychus orientalis</i>	DQ656470.1	ITS2	TATACTAAACC
464	http://dx.doi.org/10.22073/pja.v8i2.43946	<i>Eutetranychus palmatus</i>	DQ656454.1	ITS2	TATACTGAACC
465	https://doi.org/10.1093/ee/24.4.841	<i>Mononychellus progresivus</i>	X79902.1	ITS2	TGTATAGTTGG
466	https://doi.org/10.1673/031.011.13601	<i>Oligonychus afrasiaticus</i>	OQ185412.1	ITS	AGTATACAAGC
467	https://doi.org/10.3390/insects16010096	<i>Oligonychus biharensis</i>	AB926277.1	18S	ATGTAAAAAGG
468	https://doi.org/10.1007/s10493-014-9800-4	<i>Oligonychus coffeae</i>	AY750699.1	28S	ATCTAGACTCC
469	https://doi.org/10.1093/jee/toae086	<i>Oligonychus ilicis</i>	AB926284.1	18S	ATGTAAAATGG
470	https://doi.org/10.2903/j.efsa.2021.6927	<i>Oligonychus mangiferus</i>	DQ656486.1	ITS2	ATACATTTACC
471	https://doi.org/10.2903/j.efsa.2017.5075	<i>Oligonychus perditus</i>	AB926288.1	18S	ATTACAATGCC
472	https://doi.org/10.1007/s10493-016-0018-5	<i>Oligonychus perseae</i>	KY474116.1	28S	GTTTCACGTCC
473	https://doi.org/10.1093/jee/toab029	<i>Oligonychus punicae</i>	KC352232.1	18S	AAAAAATAAGG
474	https://doi.org/10.1093/jee/96.6.1675	<i>Oligonychus ununguis</i>	AB683728.1	28S	TTTTGCCAAGC
475	https://doi.org/10.1111/1744-7917.13265	<i>Panonychus citri</i>	XR_0083269 18.1	28S	CTTAAATTCGG
476	https://doi.org/10.1007/s12600-025-01291-6	<i>Panonychus ulmi</i>	AY750698.1	28S	TACTAGACTCC
477	https://doi.org/10.1080/01647954.2010.519720	<i>Petrobia harti</i>	AY750696.1	28S	TTCAATGCGC
478	https://doi.org/10.1093/jee/toz157	<i>Petrobia latens</i>	AB926229.1	18S	AACATTCTTGG
479	https://doi.org/10.1007/s10493-019-00402-3	<i>Schizotetranychus brevisetosus</i>	AB926337.1	28S	CCCACCTATGC
480	https://doi.org/10.20546/IJCMAS.2019.809.081	<i>Schizotetranychus lespedezae</i>	AB926340.1	28S	CCAGTTATCCC
481	https://doi.org/10.11158/saa.26.2.2	<i>Schizotetranychus schizopus</i>	AB926342.1	28S	TTTCTGACACC

482	https://doi.org/10.3897/BIORISK.4.58	<i>Stigmaeopsis celarius</i>	AB926253.1	18S	TAAGAATATCC
483	https://doi.org/10.1007/s10493-008-9147-9	<i>Stigmaeopsis miscanthi</i>	AB926255.1	18S	TTACAATGCC
484	https://doi.org/10.1007/s10493-022-00718-7	<i>Stigmaeopsis nanjingensis</i>	LC158888.1	18S	TATGAATATCC
485	https://doi.org/10.1016/j.aspen.2014.07.008	<i>Tetranychus bambusae</i>	AB926385.1	28S	AGATTGATCCC
486	https://doi.org/10.1016/j.pestbp.2024.106112	<i>Tetranychus cinnabarinus</i>	GU550646.1	28S	AGTCAAATCC
487	https://doi.org/10.1007/s10493-012-9645-7	<i>Tetranychus evansi</i>	AB926295.1	18S	AAAGAATATCC
488	https://doi.org/10.1603/022.038.0323	<i>Tetranychus kanzawai</i>	AY750691.1	28S	ACCATTGTCC
489	https://doi.org/10.1590/1519-6984.176665	<i>Tetranychus ludeni</i>	AB926300.1	18S	TTACCCACTCC
490	https://doi.org/10.3390/plants14121765	<i>Tetranychus macfarlanei</i>	AB926301.1	18S	AAACAGTATGC
491	https://doi.org/10.7717/peerj.14064	<i>Tetranychus merganser</i>	AB926393.1	28S	TAATCAAAGG
492	https://doi.org/10.1590/s1519-566x2010000300002	<i>Tetranychus mexicanus</i>	OK632064.1	ITS2	TATATATCTCC
493	https://doi.org/10.3389/fpls.2018.01466	<i>Tetranychus neocaledonicus</i>	AB926304.1	18S	ACTCCTTCGG
494	https://doi.org/10.1093/jee/toab110	<i>Tetranychus pacificus</i>	X99879.1	ITS2	TGCATATATGG
495	https://doi.org/10.24349/men5-cyrm	<i>Tetranychus phaselus</i>	AB926307.1	18S	AAATATCGAGC
496	https://doi.org/10.1038/s41597-024-03189-0	<i>Tetranychus piercei</i>	AY750694.1	28S	AAACCGATTCC
497	https://doi.org/10.1303/aez.2004.675	<i>Tetranychus pueraricola</i>	AB926309.1	18S	AAAATAGAACC
498	https://doi.org/10.1016/j.pestbp.2025.106827	<i>Tetranychus truncatus</i>	AY750692.1	28S	AACCCCTCTCC
499	https://doi.org/10.1007/s10493-025-01077-9	<i>Tetranychus turkestanii</i>	AB926311.1	18S	AAAACTTTGG
500	https://doi.org/10.1038/nature10640	<i>Tetranychus urticae</i>	AY750693.1	28S	ATTTCTTTTGC

How to Calculate Selectivity of Oligonucleotide Pesticides?

A very important preoperative recommendation is how to calculate the safety of a specific oligonucleotide pesticide in an ecosystem for a range of non-target organisms [4]. To do this, select a target rRNA region (for example, 500 nt long fragment of 28S rRNA) of a pest and corresponding regions of non-target organisms. This requires knowing, after DNA sequencing, the target rRNA

sequence (in our case it is 500 nt long fragment of 28S rRNA) of all invertebrates of a given ecosystem (other animals and plants will not be susceptible to 'GZ' technology due to physiological barriers). Next, align target 500 nt long fragment of 28S rRNA of all invertebrates of a given ecosystem, select the most differing part of the sequence that belongs to pest (it can be ~100 nt long sequence out of 500 nt long fragment of 28S rRNA), and then upload it to the DNAInsector web tool. Generate unique oligonucleotide pesticide 11 nt long and check one more time, adjust manually if required, that it is not complementary elsewhere to the target 500 nt long fragment of 28S rRNA of non-target invertebrates. Mathematically, with a high probability (>99.9%), this oligonucleotide pesticide will also not be complementary to other rRNAs of non-target invertebrates in a given ecosystem. Therefore, information on total rRNA (which includes 5S, 5.8S, 12S, 16S, 18S, 28S, ETS and ITS regions and comprising ca. 10,000 nt in each non-target invertebrate) is not required, what significantly simplifies the selection of potent and selective oligonucleotide pesticides [4].

Beginning from 2008, in our research work we found that pre-rRNA and mature rRNA is a convenient target for oligonucleotide pesticides, while mRNA, due to much lower concentration, will be much less susceptible to them, even if oligonucleotide pesticides will possess perfect complementarity to it. Pest rRNA comprises 80-85% of all RNA in the cell [5] and its use as a target for 'GZ' technology helps making this approach very efficient and selective at the same time [2,4]. Thousands of different mRNAs make up only 5% of all RNA and use of mature rRNA and pre-rRNA for targeting substantially increases signal-to-noise ratio, ca. $10^5:1$ (rRNA vs. random mRNA) [6].

Importantly, for 'GZ' technology it would be easy to create algorithms (plans) of designing potent and selective oligonucleotide pesticides for other cases, such as when an ecosystem contains two major pests and a dozen non-target organisms or when one species is pest and closely related species is beneficial, and many other scenarios of pest control [4]. The algorithm of 'GZ' technology is very simple and efficient, fundamentally different from all modern approaches to plant protection, including RNAi and CRISPR/Cas [3]. In a sense, 'GZ' technology is an oligo universe for the scientific exploration by a biologist or a plant protection specialist. And if they enter this oligo universe, it will enrich their capabilities.

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