

Japanese official methods for detecting unauthorized GMO

試験法	Crop plant	method	gene discription	inserted gene	detection of	Forward primer	Reverse primer	Probe	Amplicon (bp)	Reference
コメ	Rice*	qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(phospholipase D)	PLD	5'-GCTTAGGGAACAGGGAAAGTAAAGTT-3'	5'-CTTAGCATAGTCTGTGCCATCCA-3'	5'-FAM-TGAGTATGAACCTGCAGGTCCG-TAMRA-3'	80	
		qualitative Real-time PCR	insect-resistant	cry1Ac	BI63	5'-GCAGGAGTGATTATGACAGATTC-3'	5'-AAGACCGGCAACAGGATTCA-3'	5'-FAM-AATAAGTCGAGGTACCGAGCTCGAATTTCCC-TAMRA-3'	147	
		qualitative Real-time PCR	insect-resistant	cry1Ab/Ac	NNB1	5'-GCAGGAGTGATTATGACAGATTC-3'	5'-AAGACCGGCAACAGGATTCA-3'	5'-FAM-AATGAGAATTCGGTACCCGACCTGCA-TAMRA-3'	147	
	Rice*(LL601)	qualitative Real-time PCR	insect-resistant	cowpea trypsin inhibitor	CpTI2	5'-TGCAAGTCCAGGGATGAAGAT-3'	5'-ACCGCAACAGGATTCATC-3'	5'-FAM-ATGAGAAAGTGAACCTAG-MGB-3'	121	
		qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(phospholipase D)	PLD	5'-TGTGTAGCGTTTTGCGAGTCT-3'	5'-CTGATCCACTAGCAGGAGTCC-3'	5'-VIC-TGTTGTCTGCCAATGTGGCCTG-TAMRA-3'	68	
		qualitative Real-time PCR	herbicide-tolerant	phosphinothricin N-acetyltransferase (S. hygroscopicus)	LL601	5'-TATCCTTCGCAAGACCCTTC-3'	5'-ATGCTGGCCGGGCGTGGTCTG-3'	5'-FAM-TCTATATAAGGAATTCATTTCC-MGB-3'	136	
小麦	Wheat*	qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(proline-rich protein)	PRP	5'-GCACCCATGATGAGTACTACTATTCTGTA-3'	5'-TGCACCAAGATAAAGCATGTG-3'	5'-FAM-CTGTGCACATGACTGTTGTTCTTCTGTG-TAMRA-3'	117	
		qualitative Real-time PCR	endogenous gene	(acetyl-CoA carboxylase 1)	acc1	5'-GCCTACCCCTTCAACAGATGA-3'	5'-GTACCGCTTGAACCCCTTTTGTG-3'	5'-FAM-CCACCAGCAGGTAAACCAAGATACACG-TAMRA-3'	92	
		qualitative Real-time PCR (event-specific)	herbicide-tolerant	cp4epsps	MON71800	5'-TTC.TTCTCTCTCTTTGAATCTCAATACAA-3'	5'-CCCCATTGGACGTGAA-3'	5'-FAM-TCCCCCTCTCTAATTC-MGB-3'	95	
		qualitative Real-time PCR (event-specific)	herbicide-tolerant	cp4epsps	MON71700	5'-CCATCATACTATTGTGATCCATGT-3'	5'-CGCATGCGCCCAATCAGT-3'	5'-FAM-TTCCCGGACAGCGGCGCGG-TAMRA-3'	69	
		qualitative Real-time PCR (event-specific)	herbicide-tolerant	cp4epsps	MON71200	5'-CACGACGGTCACTGAGC-3'	5'-CCGTCTGCTATTGACTGTT-3'	5'-HEX-CATACGGAAZEN/AAGATGCTGCAGGGAATATTAAC-IABKfq-3'	139	
		qualitative Real-time PCR (Construct-specific)	herbicide-tolerant	cp4epsps	MON71100/71300	5'-GCGCGGTGTCATCTATTGTACTAG-3'	5'-TGACCTCGAGTAAGCTGTTAAAGC-3'	5'-FAM-ACCAAGCTTGATATCC-MGB-3'	103	
亜麻	Flax*	qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(stearoyl-acyl carrier protein desaturase 2)	SAD	5'-GCTCAACCCGATCACCACCT-3'	5'-TGCAGGAGATGTGGAGAG-3'	5'-FAM-TGTTGAGGGAGCGTGTGAAGGGA-BHQ1-3'	68	
		qualitative Real-time PCR	herbicide-tolerant	mutant acetolactate synthase	FP967	5'-AGCGCGCAAACTAGATAAA-3'	5'-ACCTTCCGGCTCGATGCTA-3'	5'-FAM-CGCGCGGGTGTCTATGTATG-BHQ1-3'	105	
パパイヤ	Papaya*	qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(chymopain)	CHY	5'-CCATGCGATCCTCCCA-3'	5'-CATCGTAGCATTGTAACACTAGCTAA-3'	5'-FAM-TTCCCTTCACTCCCTCCACTCTTGAGA-TAMRA-3'	73	
		qualitative Real-time PCR	promoter	Cauliflower mosaic virus 35S promoter	CaM	5'-GCCTCTGCCGACAGTGT-3'	5'-AAGACGTGGTGGACGCTTC-3'	5'-FAM-CAAGATGAGCCGCCACCCACG-TAMRA-3'	82	
		qualitative Real-time PCR	virus-resistance	Papaya RingSpot Virus coat protein from Taiwan strain	PRSV-YK	5'-ACACGGGGGACTCTAGAG-3'	5'-ACCGTATCCACAGCTTC-3'	5'-FAM-TCCCTTCCATGGCGTC-TAMRA-3'	76	<a href="#">Biol Pharm Bull. 2011;34(10):1648-51.*</a>
		qualitative Real-time PCR	virus-resistance	Papaya RingSpot Virus coat protein from Thailand strain	PRSV-SC	5'-CATTTCAITGGAGAGAACAGC-3'	5'-ACCAGCATCCACAGCTTC-3'	5'-FAM-ACTCTAGAGATCCATGTCCTAA-TAMRA-3'	70	<a href="#">Biol Pharm Bull. 2014;37(1):1-5.*</a>
		qualitative Real-time PCR	virus-resistance	Papaya RingSpot Virus coat protein from Chinese strain	PRSV-HN	5'-GACGAGTACAAGGAGACGCC-3'	5'-GTTGCTCACTGAAGCGGGAAG-3'	5'-FAM-TGGCTGCTATTGGCGAATCAACTAC-BHQ1-3'	174	
トウモロコシ	Maize*	conventional PCR	<a href="#">endogenous gene*</a>	(zein)	Zein	5'-CCTATAGCTCCCTTCTCC-3'	5'-TGCTGTAAATAGGCTGATGA-3'	-	157	
		conventional PCR	insect-resistant	cry1Ab, cp4epsps	BI10	5'-CACACAGGAGATTATTAGGGTTACTCA-3'	5'-ACACGGAAATGTTGAATACTCACTCT-3'	-	117	
		conventional PCR	insect-resistant	cry1Ab, cp4epsps (for confirmation)	BI10	5'-GCCACAACCCCTCAACCTCA-3'	5'-GAAGTCGTGCTCGAAGAATC-3'	-	151	
		conventional PCR	insect-resistant	pat, cry9c	CBH351	5'-CCTTCGAAAGCCCTTCTCTATA-3'	5'-GTAGCTGTCGGTGTAGTCTCGT-3'	-	170	
		conventional PCR	insect-resistant	pat, cry9c (for confirmation)	CBH351	5'-TACTACATCGACCCGATCGA-3'	5'-CCTAATCCCTTATCTGGGA-3'	-	171	
		qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(starch synthase IIb)	SSIIB	5'-COAATCCTTGACATCTGCTCC-3'	5'-GATCAGTCTGGGTCCGGA-3'	5'-FAM-AGCAAAAAAGAGCGCTGCAA-TAMRA-3'	114	
		qualitative Real-time PCR (event-specific)	insect-resistant	pat, cry34Ab1, cry35Ab1	DAS59132	5'-CCGCAATGTGTTAATGTTGTCTAAG-3'	5'-GGTGAATGTGCGCGTGTGT-3'	5'-FAM-CAATTTGTTACACCAGAGCCGACACG-TAMRA-3'	79	
		ナタネ	Rapeseed*	qualitative Real-time PCR	<a href="#">endogenous gene*</a>	(Brassica rapa acetyl CoA carboxylase)	ACCg8	5'-GGTATATACGGCTTTGGTTGC-3'	5'-AACATCAGGCTGCCAAGAAAGAT-3'	5'-VIC-CTATGTCTGAGGAATTATAA-MGB-3'
qualitative Real-time PCR	<a href="#">endogenous gene*</a>			(Brassica napus cruciferin)	BnC1	5'-GAAGCTCTCCTCTGGCTAAA-3'	5'-TCACGAATTTGAATCTGACTACTCA-3'	5'-FAM-ACGTGAATCTGATTTTGA-MGB-3'	75	
qualitative Real-time PCR	<a href="#">endogenous gene*</a>			(Aacyl-ACP thioesterase)	FatA	5'-GGTCTCTCAGCAAGTGGGTGAT-3'	5'-TCGTCCCAACTCATCTGTA-3'	5'-VIC-ATGAACCAAGACACAAGCGCGTCA-TAMRA-3'	76	
qualitative Real-time PCR	herbicide-tolerant			cp4epsps, gox	RT13 (cp4epsps, gox)	5'-CCATATTGACCATCATCTATTGCT-3'	5'-GCTTATACGAAGGCAAGAAAGGA-3'	5'-FAM-TTCCCGGACATGAGATCATCTCCCTT-TAMRA-3'	108	
パレイショ	Potato*	qualitative Real-time PCR	endogenous gene	(Adenine Phosphoribosyl Transferase)	APRT	5'-TGAAAACGATCCCGATCG-3'	5'-CAATCCACGATACGTTTC-3'	5'-FAM-TGGCGCTCATGATCCG-TAMRA-3'	90	
		qualitative Real-time PCR			F10	5'-GAAGCTATAACAATAAGTGTCC-3'	5'-CACACACTCGTTTACAC-3'	5'-FAM-TATATATCTCTGGACAGTTG-TAMRA-3'	76	
		qualitative Real-time PCR	Low Acrylamide Potential and Reduced Black Spot Bruise	partial Asn1, partial R1, partial PhL, partial Ppo5	J3	5'-ATCAAAACCGGTACTCAAATTT-3'	5'-GAGTTGTCAAATGTGAATTTATTTTC-3'	5'-FAM-CAACAGGACAACCAAGCTAGGAACTCAC-TAMRA-3'	87	
		qualitative Real-time PCR			Y9	5'-CCTCTTTCCGATCCTCAAC-3'	5'-GTTCAATTTTTAATGTTGACTATG-3'	5'-FAM-CCAGTCCAGCGAAGTCCC-TAMRA-3'	81	
		qualitative Real-time PCR			X17	5'-TAGCAAAATGATTTGTGAG-3'	5'-GATTTGGATCAACACAC-3'	5'-FAM-CGCTGCAGGATATACCGGTGT-TAMRA-3'	77	
ズッキーニ	Zucchini*	qualitative Real-time PCR	endogenous gene	(NAM, ATAF1/2 and CUC2 (NAC) domain)	NAC	5'-GAAGGATGTTAAGAAACAAAAAATG-3'	5'-AGTGGTGGTGGTGTGGGC-3'	5'-FAM-TGAGGCAAAATGATTTGTATTCTGTG-TAMRA-3'	86	
		qualitative Real-time PCR	virus-resistance	Zucchini Yellow Mosaic Virus coat protein (ZYMV-cp)	ZYMV-cp sequence	5'-TTGCAAGACCTTCTCTATATAAG-3'	5'-TCTTTGTAACCTAGCGTCTGCCAC-3'	5'-FAM-AGTTGGTGGTGGTCC-MGSEQ-3'	-	
		qualitative Real-time PCR	virus-resistance	Cucumber Mosaic Virus coat protein (CMV-cp)	CMV-cp sequence	5'-TTGCAAGACCTTCTCTATATAAG-3'	5'-CTGCTGCCAAGACTCTAAAGTTAG-3'	5'-FAM-AGCGGGAACACGACGCGG-MGSEQ-3'	-	
試験法	Animal	method	gene discription	inserted gene	detection of	Forward primer	Reverse primer	Probe	amplicon (bp)	Reference
サケ	Salmon* (Atlantic salmon)	qualitative Real-time PCR	endogenous gene	(nuclear ribosome RNA18S subunit)	18S	5'-TGTCCGCTAGAGGTGAAT-3'	5'-GCAATGCTTTCGCTTTG-3'	5'-FAM-TTGGACCGGCGCAAGCGG-TAMRA-3'	61	
		qualitative Real-time PCR (event-specific)	growth promotion	opA-F-GHc2 (Chinook salmon's growth hormone)	AquAd	5'-TGCTGTAGCCTGTGATACCAC-3'	5'-ATGCCTCTAGTGCAGTTGAGT-3'	5'-FAM-CAGTAGTACAACGTTGGCAGATGATGAGAACT-BHQ1-3'	156	<a href="#">Food Chemistry. 305:125426. (2020)*</a>

\*リンク先から詳細情報等をご覧になれます