

1 **Efficient genome editing and gene knockout in *Setaria viridis* with CRISPR/Cas9 directed gene**
2 **editing by the non-homologous end-joining pathway**

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SUPPLEMENTARY MATERIAL

Supplementary Table S1. Top 20 off-target sites of the gRNA used in this study predicted in *Setaria viridis* genome using the CCTop software.

Coordinates	Strand ¹	Mismatches	Target sequence ²	PAM	Distance ³	Gene name/ID
Chr_09:14268254-14268276 *	+	4	GACAAGGA[TGGGGATGTGAA]	GGG	492	- Sevir.9G201200.1
Chr_02:34471610-34471632	-	3	GTAGTGG[A]TGGTGAGGTGAA]	GGG	1915	- Sevir.2G263600.1
Chr_04:11547181-11547203 #	+	4	GATCTGGC[TCCTGATGTGAA]	AGG	10812	- Sevir.4G118700.1
Chr_03:710993-711015	-	4	CAGCTGGA[TTGTGGTGTGAA]	TGG	0	E Sevir.3G011900.1
Chr_06:2592841-2592863	+	4	GAATTGAA[AGGTGGTGTGAA]	GGG	16	- Sevir.6G032200.1
Chr_01:35855582-35855604	+	4	GACCTGGC[TGTCATGTGAA]	AGG	0	E Sevir.1G306300.1
Chr_04:22260779-22260801	-	4	GTTCTGGA[TGGAGAGGTGAA]	TGG	2630	- Sevir.4G161600.1
Chr_03:17717572-17717594	+	4	GAACCTAAA[TGCTGACGTGAA]	AGG	328	- Sevir.3G229500.1
Chr_04:37352407-37352429	+	4	GAACGCGA[TGGAGAGGTGAA]	CGG	0	E Sevir.4G273400.1
Chr_09:29625651-29625673	-	4	GATCTAGA[TGGGGATGAGAA]	GGG	41334	- Sevir.9G287800.1
Chr_05:37149828-37149850	+	4	AAAATGGA[TGGTCATGCGAA]	AGG	0	E Sevir.5G340200.1
Chr_03:31687859-31687881	+	4	GAGCTTGA[CGGTGATGTCAA]	TGG	47468	- Sevir.3G311300.1
Chr_03:2349442-2349464	+	4	GAAATTGT[TGGTGATGTGCA]	TGG	0	E Sevir.3G037400.1
Chr_05:37023083-37023105	-	4	GACCCGGA[GGGTGATGTGGA]	AGG	3399	- Sevir.5G338300.1
Chr_09:9774624-9774646	-	4	GCGCTGGA[TGGGGATGTGGA]	GGG	1911	- Sevir.9G151700.2
Chr_06:7819868-7819890	+	4	GGTCTGGA[TGGTCATGTGGA]	GGG	0	E Sevir.6G085300.1
Chr_01:34163227-34163249	-	4	GGTCTGGA[TGGTCATGTGGA]	GGG	0	E Sevir.1G283100.1
Chr_05:4493822-4493844	+	4	GTACGGGG[TGGTGATGTGAC]	TGG	0	E Sevir.5G057500.1
Chr_05:14897355-14897377	-	4	GAGGTGGA[TGGTGGTGTGGA]	GGG	5970	- Sevir.5G161500.1
Chr_01:33115978-33116000	-	4	GAACTAGG[TGATGATGTGAT]	CGG	384	- Sevir.1G269600.1

¹ Orientation of the off-target site.

² Off-target sequence are show with highlighted mismatches in red, while core sequence in square brackets.

³ Distance to the closest exon (0 if target site and exon coordinates overlap); Legend for off-target site positon: E = exonic; I = intronic; - = intergenic.

named in this work of off-target 1

* named in this work of off-target 2

Supplementary Table S2. Primer sets used in this study.

Gene	ID or position	Goal	Primer name	Sequence 5' - 3'	Reference
<i>bar</i>	Binary vector	PCR	BAR(F)	ACCATCGTGACCACTACATC	This work
			BAR(R)	GTGCCTGCACATCAACAAAT	
<i>ZmUBI:GFP</i>	Binary vector	PCR	<i>ZmUBI</i> (F)	TGTGTTAGATCCGTGCTGCT	This work
			GFP(R)	CATGTGGTCCCTCTTCTCGT	
Translation factor <i>SUII</i>	Sevir.2G348300	qPCR	SvSUI(F)	CCAGAGCTTGGACAGGTCATT	(Martins et al., 2016)
			SvSUI(R)	ACAATGCCAGCCTGGACAA	
<i>gfp</i> transgene	-	qPCR	GFPq(F)	CTACGGTGTTCAGTGCTTCTC	This work
			GFPq(R)	GTGTCTTGTAGTTCCC GTCATC	
Off-target1	Chr_09:14268254-14268276	PCR	Off-target1(F)	CTCATCACGACCATAAGCAGC	This work
Off-target2	Chr_04:11547181-11547203	PCR	Off-target2(F)	ATCTGAAGTGGCACAGCAA	This work
			Off-target2(R)	TGTGCAGAGCATTGGGT CAT	

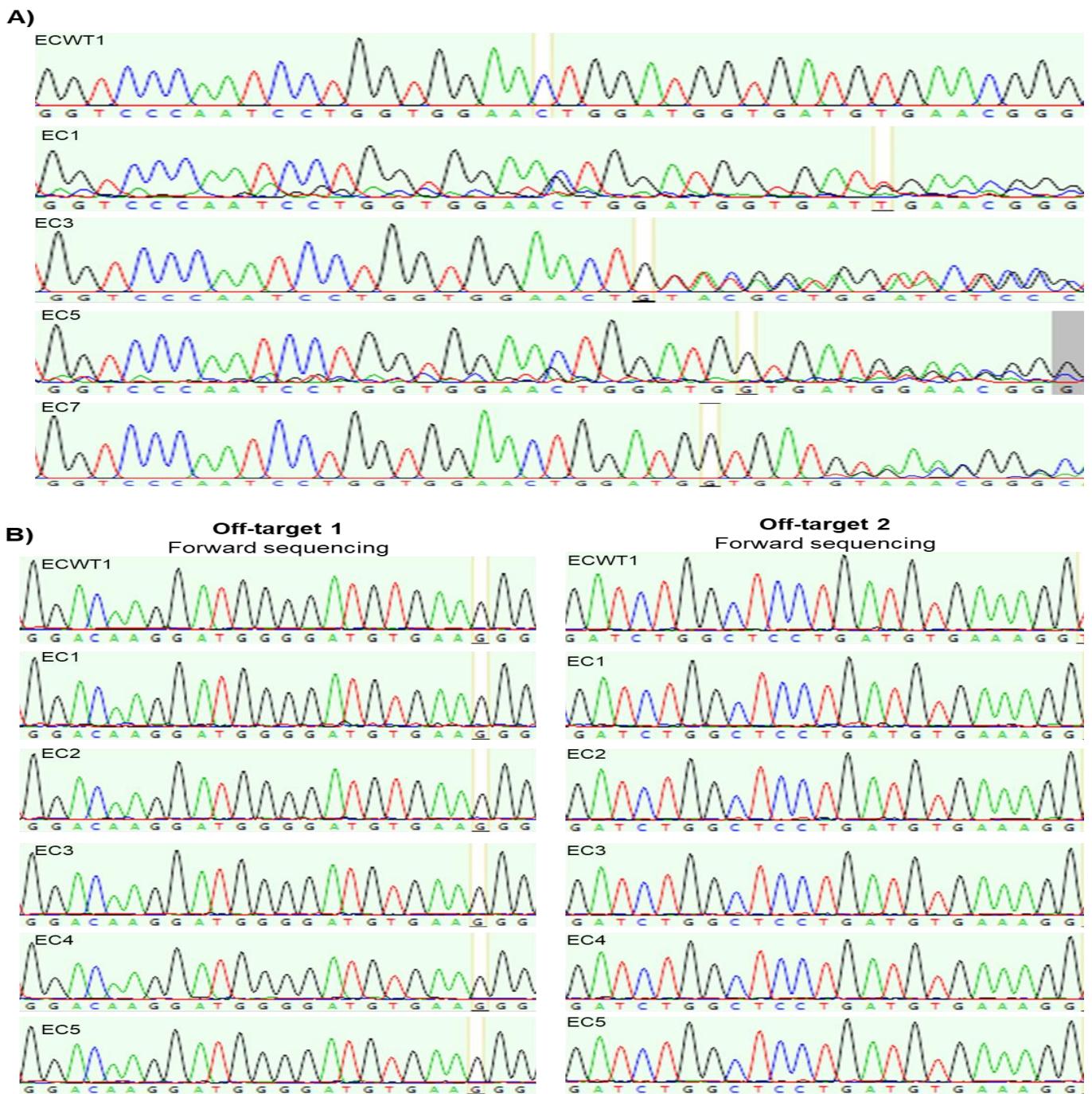
Supplementary Table S3: Decoding of mono and biallelic *indels* introduced by CRISPR/Cas9 NHEJ system in *gfp* transgene. For decoding were performed the direct Sanger sequencing of PCR products from the target gene of *Setaria viridis* co-transforming EC1 to EC10 events compared with ECWT1 and ECWT2 plant (GFP-positive controls, wild-type *gfp* gene, and negative control for genome editing).

Events	Chromatogram analysis and degenerate nucleotide sequence	Results of genome edition
ECWT1	GGATGGTGTGATGTGAACGGGCAC	Non-edited control lineage 1
ECWT2	GGATGGTGTGATGTGAACGGGCAC	Non-edited control lineage 2
	GGAACCTGGATGGTGTGAT ^{T/G} ^{T/G} ^{G/A} ^{A/C} ^{C/G} ^{GGC} ^{A/C} ^{C/A/C} (possibilities from chromatogram) GGAACCTGGATGGTGTGAT K K R A M S G G C M C M (degenerate nucleotides) GGAACCTGGATGGTGTGAT G G A A A G G G C A C A (possibilities 1) GGAACCTGGATGGTGTGAT T T G A C C G G C C C C (possibilities 2)	
	Alignments: ECWT lineage GGAACCTGGATGGTGTGATGTGAACGGGCAC- EC1 lineage GGAACCTGGATGGTGTGAT-KKRAMSGGCMCM Allele 1 GGAACCTGGATGGTGTGAT TGAACGGGCACA *****-*****	Allele 1: deletion of G nucleotide at position 5 upstream to the PAM sequence. Allele 2: no indels. Therefore, the EC1 event has the <i>gfp</i> transgene knocked out in a single allele (heterozygous or monoallelic mutant).
EC1	ECWT lineage GGAACCTGGATGGTGTGATGTGAACGGGCAC Allele 2 GGAACCTGGATGGTGTGAT GTGAACGGGCAC *****	
	[] Information retrieved of chromatogram from reverse sequencing	
	GGAACCTGGATGGTGTGAT ^{G/A} ^{T/A} ^{T/C} ^{G/C} ^{A/G} ^{C/A} ^{C/G} ^{A/G} ^{C/G} ^{C/A} ^A GGAACCTGGATGGTGTGAT G W W S M R S S R S M A GGAACCTGGATGGTGTGAT G A A G A A G G A G A G A A GGAACCTGGATGGTGTGAT T T C A G C C G C G C C A	
	Alignments: ECWT lineage GGAACCTGGATGGTGTGAT-TGAACGGGCAC EC2 lineage GGAACCTGGATGGTGTGATGWWMSRSSRSMA- Allele 1 GGAACCTGGATGGTGTGAT TGAACGGGCAC - *****	Allele 1: insertion of A nucleotide at position 5 upstream to the PAM sequence. Allele 2: deletion of GA nucleotides at positions 2 and 3 upstream to the PAM sequence. Therefore, the EC2 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).
EC2	ECWT lineage GGAACCTGGATGGTGTGATGTGAACGGGCACAA Allele 2 GGAACCTGGATGGTGTGAT T - ACGGGCACAA *****	
	[] Information retrieved of chromatogram from reverse sequencing	
	Chromatogram from forward sequencing: GGAACCTG ^{T/G} ^{A/T} ^{C/T} ^{G/A} ^{C/G} ^{A/T} ^{G/A} ^{G/A} ^{A/T} ^{A/T} ^C ^{T/G} ^{C/G} ^{C/G} ^{C/G} ^{A/T} ^{CA} ^{G/A} ^{G/C} ^{T/G} GGAACCTG K W Y R S W R G W W C K S S S W C A R S K GGAACCTG G A C A G A A G A A C G G G G A C A A G G GGAACCTG T T G C T G G T T C T C C C C T C A G G C T	Allele 1: deletion of ATGT nucleotides at positions 4 to 7 upstream to the PAM sequence. Allele 2: two deletions of G nucleotide at positions 14 and 11 upstream to the PAM sequence. Therefore, the EC3 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).
EC3	Alignments:	

	ECWT lineage	GGAACCTGGATGGTATGTGAACGGGCACAAGT		
	EC3 lineage	GGAACCTGKWYRSWR----GWWCKSSSWCARSK		
	Allele 1	GGAACCTG GATGGTG ---- GAACGGGCACAAGT *****-*-----*-----*-----*-----?????		
	ECWT lineage	GGAACCTGGATGGTATGTGAACGGGCACAA		
	Allele 2	GGAACCTG- TT - CACAAGTTCTCCGT CACAA *****-*------*-----*-----*-----*		
	[] Information retrieved of chromatogram from reverse sequencing			
	Chromatogram from reverse sequencing			
	GACGGAGAACATTGTG	A/c A/c C G/A T/G T/c C A C C/A T/A C c/G A T/G T T/G c/G		
	GACGGAGAACATTGTG	M M C R K T Y C A C M W C S A K T K S S		
	GACGGAGAACATTGTG	A A C G T T CA C C T C C A A T G C C		
	GACGGAGAACATTGTG	C C C A G T C C A C A A C G A T T T G G		
	Alignments:			
	ECWT lineage	GACGGAGAACATTGTG CCCCGTT CACATC-ACCA-T-CC		
	EC3 lineage	GACGGAGAACATTGTG MMCRKY -CA-CMWCSAKTKSS		
	Allele 1	GACGGAGAACATTGTG CCC GTT - CA - CCACCATGCC *****-*------*-----*-----*-----*		
	ECWT lineage	GACGGAGAACATTGTG--CCC-GTTCACATC-ACC-ATCCAGTTCC		
	Allele 2	GACGGAGAACATTGTG AA -- CAGTT CACAT CGA -- GTT - CAGTTCC *****-*------*-----*-----*-----*		
	[] Information retrieved of chromatogram from forward sequencing			
	GGAACCTGGATGGTGAT	T/G T/G A G/A C/A G/A G/C G G/A CA A/c G/A		
	GGAACCTGGATGGTGAT	K K A R M R S G S R C A M R		
	GGAACCTGGATGGTGAT	T T A G C G G G G C A A G		
	GGAACCTGGATGGTGAT	G G A A A A C G C A C A C A		
	Alignments:			
EC4	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAAG		
EC4	EC4 lineage	GGAACCTGGATGGTGAT-KKARMRSGSRCAMR		
EC4	Allele 1	GGAACCTGGATGGTGAT- TGAACGGGCACAAG *****-*------*-----*		
	ECWT lineage	GGAACCTGGATGGTGATGT-GAACGGGCACA		
	Allele 2	GGAACCTGGATGGTGAT GTA GAACGGGCACA *****-*------*-----*		
	[] Information retrieved of chromatogram from forward sequencing			
EC5	GGAACCTGGATGGTGAT	T/G G/A A C/A C G/A C/G C/A A/c CA A/c T/G		
EC5	GGAACCTGGATGGTGAT	K R A M C R S S M M C A M K		
	Allele 1: deletion of G nucleotide at position 5 upstream to the PAM sequence.			
	Allele 2: insertion of A nucleotide at position 4 upstream to the PAM sequence. Therefore, the EC4 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).			
	Allele 1: deletion of G nucleotide at position 5 upstream to the PAM sequence.			

	<p>GGAACCTGGATGGTGAT T G A C C G C C A A C A A T</p> <p>GGAACCTGGATGGTGAT G A A A C A G G C C C A C G</p> <p>Alignments:</p> <p>ECWT lineage GGAACCTGGATGGTGATGTGAACGGGCACAAG</p> <p>EC5 lineage GGAACCTGGATGGTGAT-KRAMCRSSMMCAMK</p> <p>Allele 1 GGAACCTGGATGGTGAT-TGAACGGGAACAAG *****</p> <p>ECWT lineage GGAACCTGGATGGTGATGTGAACGGGCACA</p> <p>Allele 2 GGAACCTGGATGGTGAT--GAACGGGCACA *****</p>	<p>Allele 2: deletions of GT nucleotides at positions the 4 to 5 upstream to the PAM sequence. Therefore, the EC5 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).</p>
	<p>[] Information retrieved of chromatogram from reverse sequencing</p> <p>GGAACCTGGATGGTGATG A/T A/T C/G A/G A/G C/G C/G G/A C/G C/A A</p> <p>GGAACCTGGATGGTGATG W W S R R S S R S M A</p> <p>GGAACCTGGATGGTGATG A A C A A C C G C C C A</p> <p>GGAACCTGGATGGTGATG T T G G G G A G A A</p> <p>Alignments:</p> <p>ECWT lineage GGAACCTGGATGGTGATGTGAACGGGCACA</p> <p>EC6 lineage GGAACCTGGATGGTGATG--WWSRRSSRSMA</p> <p>Allele 1 GGAACCTGGATGGTGATG--AACGGGCACA *****</p> <p>ECWT lineage GGAACCTGGATGGTGATG-TGAACGGGCACA</p> <p>Allele 2 GGAACCTGGATGGTGATGTTGAACGGGCACA *****</p>	<p>Allele 1: deletion of TG nucleotides at position 3 to 4 upstream to the PAM sequence. Allele 2: insertion of T nucleotide at position 5 upstream to the PAM sequence. Therefore, the EC6 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).</p>
EC6	<p>GGAACCTGGATGGTGATG A/T A/G A A/C G/G C/G A/C A/C</p> <p>GGAACCTGGATGGTGATG W R A M S G G S M M M</p> <p>GGAACCTGGATGGTGATG A A A A G G G C A A A</p> <p>GGAACCTGGATGGTGATG T G A C C G G G C C C</p> <p>Alignments:</p> <p>ECWT lineage GGAACCTGGATGGTGATGTGAACGGGCAC</p> <p>EC6 lineage GGAACCTGGATGGTGATGWWRAMSGGSMM</p> <p>Allele 1 GGAACCTGGATGGTGATG-TGAACGGGCAC *****</p> <p>ECWT lineage GGAACCTGGATGGTGATGTGAACGGGCACA</p> <p>Allele 2 GGAACCTGGATGGTGATG--AACGGGCACA *****</p>	<p>Allele 1: no indels. Allele 2: deletion of TG nucleotides at positions 3 to 4 upstream to the PAM sequence. Therefore, the EC7 event has the <i>gfp</i> transgene knocked out in a single allele (heterozygous or monoallelic mutant).</p>
EC7	<p>[] Information retrieved of chromatogram from reverse sequencing</p> <p>GGAACCTGGATGGTGATG T/G A/G A A/C C/G G/G C/G A/C A/C</p> <p>GGAACCTGGATGGTGATG K R A M S G G S M M M</p>	<p>Allele 1: deletion of T nucleotide at position 4 upstream to the PAM sequence.</p>
EC8		

	<p>GGAACCTGGATGGTGATG T A A A C G G C A A A</p> <p>GGAACCTGGATGGTGATG G G A C G G G G C C C</p> <p>Alignments:</p> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACA</td> </tr> <tr> <td>EC8 lineage</td> <td>GGAACCTGGATGGTGATGKRAMSGGSMMM</td> </tr> <tr> <td>Allele 1</td> <td>GGAACCTGGATGGTGATG-GAACGGGCACA *****</td> </tr> </table> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCAC</td> </tr> <tr> <td>Allele 2</td> <td>GGAACCTGGATGGTGATGTGAACGGGCAC *****</td> </tr> </table>	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACA	EC8 lineage	GGAACCTGGATGGTGATGKRAMSGGSMMM	Allele 1	GGAACCTGGATGGTGATG-GAACGGGCACA *****	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCAC	Allele 2	GGAACCTGGATGGTGATGTGAACGGGCAC *****	Allele 2: no indels. Therefore, the EC8 event has the <i>gfp</i> transgene knocked out in a single allele (heterozygous or monoallelic mutant).
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACA											
EC8 lineage	GGAACCTGGATGGTGATGKRAMSGGSMMM											
Allele 1	GGAACCTGGATGGTGATG-GAACGGGCACA *****											
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCAC											
Allele 2	GGAACCTGGATGGTGATGTGAACGGGCAC *****											
	<p>GGAACCTGGATGGTGATG ^{A/T} G/A C/A ^{A/G} C/G G ^{G/C} G/A C ^{C/A} C/A</p> <p>GGAACCTGGATGGTGATG W R M R S G S R C M M</p> <p>GGAACCTGGATGGTGATG A G C A C G G G C A C</p> <p>GGAACCTGGATGGTGATG T A A G G G C A C C A</p> <p>Alignments:</p> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>EC9 lineage</td> <td>GGAACCTGGATGGTGATGWRMRSGSRCMM</td> </tr> <tr> <td>Allele 1</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC *****</td> </tr> </table> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>Allele 2</td> <td>GGAACCTGGATGGTGATG--AACGGGCACAC *****</td> </tr> </table>	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	EC9 lineage	GGAACCTGGATGGTGATGWRMRSGSRCMM	Allele 1	GGAACCTGGATGGTGATGTGAACGGGCACAC *****	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	Allele 2	GGAACCTGGATGGTGATG--AACGGGCACAC *****	<p>Allele 1: no indels.</p> <p>Allele 2: deletion of TG nucleotides at positions 3 to 4 upstream to the PAM sequence. Therefore, the EC7 event has the <i>gfp</i> transgene knocked out in a single allele (heterozygous or monoallelic mutant).</p>
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
EC9 lineage	GGAACCTGGATGGTGATGWRMRSGSRCMM											
Allele 1	GGAACCTGGATGGTGATGTGAACGGGCACAC *****											
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
Allele 2	GGAACCTGGATGGTGATG--AACGGGCACAC *****											
EC9	<p>[] Information retrieved of chromatogram from reverse sequencing</p> <p>GGAACCTGGATGGTGATG ^{G/A} A ^{A/C} C/G GG ^{G/C} AC ^{A/C} A</p> <p>GGAACCTGGATGGTGATG R A M S GG S AC M A</p> <p>GGAACCTGGATGGTGATG G A A C G G G AC A A</p> <p>GGAACCTGGATGGTGATG A A C G G G C A C C A</p> <p>Alignments:</p> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>EC9 lineage</td> <td>GGAACCTGGATGGTGATGWRMRSGSRCMM</td> </tr> <tr> <td>Allele 1</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC *****</td> </tr> </table> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>Allele 2</td> <td>GGAACCTGGATGGTGATG--AACGGGCACAC *****</td> </tr> </table>	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	EC9 lineage	GGAACCTGGATGGTGATGWRMRSGSRCMM	Allele 1	GGAACCTGGATGGTGATGTGAACGGGCACAC *****	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	Allele 2	GGAACCTGGATGGTGATG--AACGGGCACAC *****	<p>Allele 1: no indels.</p> <p>Allele 2: deletion of TG nucleotides at positions 3 to 4 upstream to the PAM sequence. Therefore, the EC7 event has the <i>gfp</i> transgene knocked out in a single allele (heterozygous or monoallelic mutant).</p>
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
EC9 lineage	GGAACCTGGATGGTGATGWRMRSGSRCMM											
Allele 1	GGAACCTGGATGGTGATGTGAACGGGCACAC *****											
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
Allele 2	GGAACCTGGATGGTGATG--AACGGGCACAC *****											
EC10	<p>[] Information retrieved of chromatogram from reverse sequencing</p> <p>GGAACCTGGATGGTGATG ^{G/A} A ^{A/C} C/G GG ^{G/C} AC ^{A/C} A</p> <p>GGAACCTGGATGGTGATG R A M S GG S AC M A</p> <p>GGAACCTGGATGGTGATG G A A C G G G AC A A</p> <p>GGAACCTGGATGGTGATG A A C G G G C A C C A</p> <p>Alignments:</p> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>EC10 lineage</td> <td>GGAACCTGGATGGTGATGRAMSGGSACMA</td> </tr> <tr> <td>Allele 1</td> <td>GGAACCTGGATGGTGATG--AACGGGCACAC *****</td> </tr> </table> <table border="0"> <tr> <td>ECWT lineage</td> <td>GGAACCTGGATGGTGATGTGAACGGGCACAC</td> </tr> <tr> <td>Allele 2</td> <td>GGAACCTGGATGGTGATG-GAACGGGACCA C *****</td> </tr> </table>	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	EC10 lineage	GGAACCTGGATGGTGATGRAMSGGSACMA	Allele 1	GGAACCTGGATGGTGATG--AACGGGCACAC *****	ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC	Allele 2	GGAACCTGGATGGTGATG-GAACGGGACCA C *****	<p>Allele 1: deletions of TG nucleotides at positions 3 to 4 upstream to the PAM sequence.</p> <p>Allele 2: deletion of T nucleotide at position 3 upstream to the PAM sequence. Therefore, the EC10 event has the <i>gfp</i> transgene knocked out in both alleles (biallelic mutant).</p>
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
EC10 lineage	GGAACCTGGATGGTGATGRAMSGGSACMA											
Allele 1	GGAACCTGGATGGTGATG--AACGGGCACAC *****											
ECWT lineage	GGAACCTGGATGGTGATGTGAACGGGCACAC											
Allele 2	GGAACCTGGATGGTGATG-GAACGGGACCA C *****											



Supplementary Figure S1. Inheritance *indels* induced by CRISPR/Cas9 NHEJ system and absence of off-targets. **(A)** Inheritance and stability of mutations induced by CRISPR/Cas9 from T₀ to T₁ generation. Sanger sequencing of PCR products from the ZmUBI:GFP target sequence of the CRISPR/Cas9 NHEJ system. Sequencing forward and reverse were carried out using ZmUBI(F) and GFP(R) primers (Supplemental Table S2). The co-transforming EC1, EC3, EC5, and EC7 events compared to ECWT1 plants (wild-type *gfp* gene, negative control for edition) from T₁ generation. **(B)** Absence of putative off-targets in regions outside the target induced by the CRISPR/Cas9 NHEJ system. Sanger sequencing of PCR products from top three predicted off-target sites (Supplemental Table S1) in the co-transforming EC1 to EC5 events compared with ECWT1 plants (wild-type *gfp* gene, negative control for edition) from T₀ generation. PCR and sequencing were performed using primers flanking the off-target sites (Supplemental Table S2).

Supplementary File S1. Nucleotide and deduced amino acid sequences of the *gfp* gene used in this study.

GFP_CDS without intron

ECWT1 and ECWT2

Allele 1: wild-type gene

Allele 2: wild-type gene

Atggcaaggcgagaaactgttactggcgtggccatctggtggaactggatggatgtgaa_{cgg}gcacaagttccgtcagcggaga
gggtgaaggtatgcacctacgaaagctaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctcgtcaccactt
tcacctacgggtttagtgcctcccggtacccagatcacatgaagcagcatgacttcttaagagcgcctatgcccgaaggctacgtgcaagaa
aggactatcttcaaggatgcggaaactacaagacacgtgcccgaacttgcaggtataccctggtaaccgtcgagacttcaactccacaacgtatacatcatgcccgaacagcagaaga
tacgtattcaaggatggaaacatctccggacacaactggatgaaacttcaacatcgaagatggaaacgtcaacttgcggaccactaccaggcagaacacgcccattcggcgat
ggccctgtctgctgggacaaccattacctgtccacgcatactgccctctccaggaccaccaacgagaagagggaccatgttctgctgga
gttgcgtgacggctgctggatcacgcatacgatggatgaaacttacaagtga

atggcaaggcgagaaactgttactggcgtggccatctggtggaactggatggatgtg

M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gatgtga	acgg	gcaca	agtt	tcc	gtc	agc	cg	gag	agg	gtt	gaag	gtt	atg	cc	ac	ct	ac	tg	ga
D	V	N	G	H	K	F	S	V	S	G	E	G	E	G	D	A	T	Y	G
aag	ctt	cc	ct	gt	aa	tt	ca	t	tc	gt	ac	cc	gg	aa	g	cc	ct	gt	gg
K	L	T	L	K	F	I	E	T	T	G	K	L	P	V	P	W	P	T	L
gtc	acc	ac	tt	t	cac	c	tac	cg	gt	tt	ca	gt	tt	cc	cg	ta	cc	ca	ac
H	D	F	F	K	S	A	M	P	E	G	Y	V	Q	E	R	T	I	F	F
aaggat	gac	gg	aa	ct	aca	ag	ac	ac	gt	g	cc	ga	ag	gt	ca	ag	aa	gg	ac
K	D	D	G	N	Y	K	T	R	A	E	V	K	F	E	G	D	T	L	V
aacc	gc	at	c	g	ag	ct	g	aa	gg	t	at	tc	ag	g	aa	at	c	c	gg
N	R	I	E	L	K	G	I	D	F	K	E	D	G	N	I	L	G	H	K
ctgg	agg	t	ac	a	c	act	cc	c	a	c	gt	t	a	ca	tg	cc	g	ca	ac
L	E	Y	N	Y	N	S	H	N	V	Y	I	M	A	D	K	Q	K	N	G
atca	agg	gt	aa	ct	ca	ag	at	ca	ag	g	at	gg	aa	ac	at	c	c	gg	ac
I	K	V	N	F	K	I	R	H	N	I	E	D	G	S	V	Q	L	A	D
cact	acc	ag	c	g	a	ac	ac	cc	cc	at	cg	cg	at	gg	cc	ct	gt	cc	gg
H	Y	Q	Q	N	T	P	I	G	D	G	P	V	L	L	P	D	N	H	Y
ctgt	cc	ac	g	ca	at	t	g	cc	ct	t	cc	a	gg	ac	cc	ca	ac	gg	ac
L	S	T	Q	S	A	L	S	K	D	P	N	E	K	R	D	H	M	V	L
ctgg	ag	tt	cg	t	g	ac	gg	ct	g	ct	gg	g	at	cc	g	at	tt	ca	ag
L	E	F	V	T	A	A	G	I	T	H	G	M	D	E	L	Y	K	-	

EC1 co-transforming event: monoallelic

Allele 1: deletion of G

Atggcaaggcgagaaactgttactggcgtggccatctggtggaactggatggatgtgaa_Gtaacggcacaagttccgtcagcggaga
gggtgaaggtatgcacctacgaaagctaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctcgtcaccactt
tcacctacgggtttagtgcctcccggtacccagatcacatgaagcagcatgacttcttaagagcgcctatgcccgaaggctacgtgcaagaa
aggactatcttcaaggatgcggaaactacaagacacgtgcccgaacttgcaggtataccctggtaaccgtatacatcatgcccgaacagcagaaga
tacgtattcaaggatggaaacatctccggacacaactggatgaaacttcaagatcgaagatggaaacatcctcgacacaag
acggcatcaaggatggaaacatctccggacacaactggatgaaacttcaagatcgaagatggaaacatcctcgacacaag
ggccctgtctgctgggacaaccattacctgtccacgcatactgccctctccaggaccaccaaccaggcagaacacgcccattcggcgat
gttgcgtgacggctgctggatcacgcatacgatggatgaaacttacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gtt	gg
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	tga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtt	aag	gtt	atg	cca	cct	acg	gaa
D	-	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E
agc	tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctg	ttc	cgt	ggc	caa	ccc	tgc
S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S
tca	cca	ctt	tca	cct	ac	gt	gt	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc
S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S
atg	act	tct	tca	aga	g	cc	tgc	ccg	aag	g	ct	ac	tg	cc	aag	aaa	g	ga	ct
M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S
agg	atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtt	ata	ccc	tgg	tga
R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-
acc	gca	tgc	agc	tga	aag	gta	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca	agc
T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S
tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca
W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A	
tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tgc	aag	atg	gaa	g	tc	cc	tgg	ccg	ac
S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T
act	acc	agc	aga	aca	cgc	cca	tcg	g	cg	atg	gcc	ctg	tgc	tgc	ccg	aca	acc	att	acc
T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T

tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc
C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C
tgg	agt	tcg	tga	cgg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aac	tct	aca	agt		
W	S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S		

Allele 2: no *indels*

atg	ggc	aag	ggc	gag	gaa	ctg	tcc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gtg	aac	ggg	cac	aag	tcc	tcc	gtc	agc	gga	gag	ggt	gaa	ggt	gat	gcc	acc	tac	gga
D	V	N	G	H	K	F	S	V	S	G	E	G	E	G	D	A	T	Y	G
aag	ctc	acc	ctg	aag	tcc	atc	tgc	act	acc	gga	aag	ctc	cct	gtt	ccg	tgg	cca	acc	ctc
K	L	T	L	K	F	I	C	T	T	G	K	L	P	V	P	W	P	T	L
gtc	acc	act	ttc	acc	tac	ggt	gtt	cag	tgc	tcc	cgg	tac	cca	gat	cac	atg	aag	cag	
V	T	T	F	T	Y	G	V	Q	C	F	S	R	Y	P	D	H	M	K	Q
cat	gac	ttc	ttc	aag	agc	gcc	atg	ccc	gaa	ggc	tac	gtg	caa	gaa	agg	act	atc	ttc	ttc
H	D	F	F	K	S	A	M	P	E	G	Y	V	Q	E	R	T	I	F	F
aag	gat	gac	ggg	aac	tac	aag	aca	cgt	gcc	gaa	gtc	aag	ttc	gaa	ggt	gat	acc	ctg	gtg
K	D	D	G	N	Y	K	T	R	A	E	V	K	F	E	G	D	T	L	V
aac	cgc	atc	gag	ctg	aaa	ggt	atc	gat	tcc	aag	gaa	gat	gga	aac	atc	ctc	gga	cac	aag
N	R	I	E	L	K	G	I	D	F	K	E	D	G	N	I	L	G	H	K
ctg	gag	tac	aac	tac	aac	tcc	cac	aac	gta	tac	atc	atg	gcc	gac	aag	cag	aag	aac	ggc
L	E	Y	N	Y	N	S	H	N	V	Y	I	M	A	D	K	Q	K	N	G
atc	aag	gtg	aac	ttc	aag	atc	agg	cac	aac	atc	gaa	gat	gga	agc	gtg	caa	ctg	gcg	gac
I	K	V	N	F	K	I	R	H	N	I	E	D	G	S	V	Q	L	A	D
cac	tac	cag	cag	aac	acg	ccc	atc	ggc	gat	ggc	cct	gtc	ctg	ctg	ccg	gac	aac	cat	tac
H	Y	Q	Q	N	T	P	I	G	D	G	P	V	L	L	P	D	N	H	Y
ctg	tcc	acg	caa	tct	gcc	ctc	tcc	aag	gac	ccc	aac	gag	aag	agg	gac	cac	atg	gtc	ctg
L	S	T	Q	S	A	L	S	K	D	P	N	E	K	R	D	H	M	V	L
ctg	gag	ttc	gtg	acg	gct	gct	ggg	atc	acg	cat	ggc	atg	gat	gaa	ctc	tac	aag	tga	
L	E	F	V	T	A	A	G	I	T	H	G	M	D	E	L	Y	K	-	

EC2 co-transforming event: biallelic

Allele 1: insertion of A

Atgggcgaaaggcgagggactgttcaactggcgtggccaaatcctggtggaactggatggtgatg**A**Atgaacgggcacaagttctccgtcagccggagggtgaagggtgtatggcacctacggaaagctcaccctgaagttcatctgcactacccggaaagctccctgttccgtggccaaaccctcgtcaccactttcacctacgggtttcagtgccttcccggtaccccgatcacatgaagcagcatgacttcttaagagcgcattgcggcaaggctacgtcaagaaggactatcttcttcaaggatgcggaaactacaagacacgtgcggaaagtcaagttcaaggatggatcacccctgttgcggccatcgagctgaaaggtatcgatttcaaggaagatggaaacatcctcgacacaagctggagtacaactacaactcccacaacgtatacatcatggccgacaagcagaagaacggcatcaaggtgaacttcaagatcaggcacaacatcgaaagatgaaagcgtgcacttggcgaccactaccagcagaacacgccccatcgccgtggccctgtctgtccggacaccattacctgtccacgcatactggccctctccaaggaccccaacgagaagaggaccacatggctctgttgcgttgcggatcacgcatacgcatggatgaaacttctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gat	gaa	cgg	gca	caa	gtt	ctc	cgt	cag	cgg	aga	ggg	tga	agg	tga	tgc	cac	cta	cggt
D	D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R
aaa	gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cggt	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct
K	A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P
cgt	cac	cac	ttt	cac	cta	cgg	tgt	tca	gtg	ctt	ctc	ccg	gta	ccc	aga	tca	tat	gaa	gca
R	H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A
gca	tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aag	gac	tat	ctt	ctt
A	-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L
caa	gga	tga	cgg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	gggt
Q	G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G
gaa	ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	ccg	aca	caa
E	P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q
gct	gga	gta	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	ggg
A	G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R
cat	caa	gggt	gaa	ctt	caa	gat	cag	gca	caa	cat	cga	aga	tgg	aag	cgt	gca	act	ggc	ggg
H	Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G
cca	cta	cca	gca	gaa	cac	gcc	cat	cgg	cga	tgg	ccc	tgt	cct	gct	gcc	gga	caa	cca	tta
P	L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L
cct	gtc	cac	gca	atc	tgc	cct	ctc	caa	gga	ccc	caa	cga	gaa	gag	gga	cca	cat	ggt	cct
P	V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P
gct	gga	gtt	cgt	gac	ggc	tgc	tgg	gat	cac	gca	tgg	cat	gga	tga	act	cta	caa	gtg	
A	G	V	R	D	G	C	W	D	H	A	W	H	G	-	T	L	Q	V	

Allele 2: deletion of GA

Atgggcaggcgaggaactgttactggcgtggccatctggtaactggatgtgt**GA**gaacgggcacaagttctccgtcagcc
agagggtaaggtatgccaccta^cggaaagtcaccctgaaagtcatctgcactaccggaaagctccctgtccgtggccaaacctcgtcacca
ctttcacctacggtgtttagtgcctcccggtacc^cagatcacatgaagcagcatgacttcaagagcgc^catgcccgaagg^tacgtgcaa
gaaaggactatcttcaaggatgacgg^aactacaagacacgtggc^aagtcaagttcgaagg^tgtatacc^tggtaaccgc^catcgag^tgaa
aggat^tatcgattcaaggaatg^aacatctcg^agacacaact^tggactacaactccacaactgtatacatcatggccgacaagg^caga
agaacggcatcaagg^tgaacttcaagatcaggc^aacatcg^aagatgg^aactggc^tgcaactggcggaccactacc^cagcagaacacgccccatcg^cgc
gatggccctgtctgtccgcgaccaaccattac^tgtccacgc^aatctgcctctcaaggaccccaac^cgagaagagg^tgaccatgttctgt
ggatgttgcggcgtggatc^cacgc^tatggatgtacttacaagt^tga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gtg	aga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg
D	V	R	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T
gaa	agc	tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctg	ttc	cgt	ggc	caa	ccc
E	S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P
tcg	tca	cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc
S	S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S
agc	atg	act	tct	tca	aga	ggc	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	ggg	cta	tct	tct
S	M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S
tca	agg	atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtg	ata	ccc	tgg
S	R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W
tga	acc	gca	tcg	agc	tga	aag	gta	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca
-	T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T
agc	tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg
S	W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	
gca	tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tgc	aag	atg	gaa	gcg	tgc	aac	tgg	ggg
A	S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R
acc	act	acc	agc	aga	aca	cgc	cca	tgc	gcg	atg	gcc	ctg	tcc	tgc	tgc	cg	aca	acc	att
T	T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I
acc	tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc
T	C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S
tgc	tgg	agt	tcg	tga	cgg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aac	tct	aca	agt	
C	W	S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S	

EC3 co-transforming event: biallelic

Allele 1: deletion of ATGT

Atgggcgaggcgaggaactgttcaactggcgtggccaaatctgggaaactggatggtg**ATGT**gaa cggggcacaagttctccgtcagcggagg
agggtgaaggtatgccacctacggaaagtcaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctgtcaccact
ttcacctacggtgttcaagtgttcccggtacccagatcacatgaagcagcatgacttctcaagagcgcacatgcccgaaggctacgtgcaaga
aaggactatcttccaaggatgacggaaactacaagacacgtggcaaggtcaagtgttcaaggtgataaccttggtaaccgcacatcgagctgaaag
gtatcgatttcaaggaagatggaaacatcttccggacacaaactgggatcaactacaacttccacaacgtatacatatggccgacaaggcagaag
aacggcatcaagggtgaaacttcaagatcaggccacaatcgaaatgttcaagggcgtcaacttggccggaccactaccaggcagaacacgcggccatcgccga
tggccctgtctgttcccgaccaattacctgttccacgcatactggccctctccaaggacccaaacgagaaggggaccatggatgttccctgttgg
atttgttcaagggttcccgaccaattacctgttccacgcatactggccctctccaaggacccaaacgagaaggggaccatggatgttccctgttgg

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg	gaa	agc
G	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E	S
tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctg	ttc	cgt	ggc	caa	ccc	tcg	tca
S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S	S
cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	ata	tga	agc	agc	atg
P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S	M
act	tct	tca	aga	gcg	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	gga	cta	tct	tct	tca	agg
T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S	R
atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tgc	aag	gtg	ata	ccc	tgg	tga	acc
M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-	T
gca	tcg	agc	tga	aag	gta	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca	agc	tgg
A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S	W
agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca	tca
S	T	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A	S
agg	tga	act	tca	aga	tca	ggc	aca	aca	tcg	aag	atg	gaa	gcg	tgc	aac	tgg	cg	acc	act
R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T	T
acc	agc	aga	aca	cgc	cca	tcg	gcg	atg	gcc	ctg	tcc	tgc	tgc	cg	aca	acc	att	acc	tgt
T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T	C
cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc	tgg
P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C	W
agt	tcg	tga	cgg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aac	tct	aca	agt			
S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S			

Allele 2: two deletions of G

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AtgggcaggcgaggaactgttactggcgtggccatctgggactgGatGtgtatgtaacggcacaagttccgtcagcgga
agggtgaagggtatgccacacctacggaaagctaccctgaagttcatctgactaccggaaagtcctgttccgtggccaaaccctcgtaaccact
ttcacctacgggtttcgttcccgataccatgaagcgcatacttcaagtgacttcaagttcgaaggtgataccctggtaaccgcatacgctgaa
aaggactatcttcaaggatgacgggaaactacaagacacgtggcaagtcaagttcgaaggtgataccctggtaaccgcatacgctgaa
gtatcgatttcaaggaagatggaaacatcctcgacacaagctggagactacaactacaactcccacaacgtatacatcatggccgacaagcaga
aacggcatcaagggtgaaacttcaagatcaggcacaacatcgaagatggaaacgcgtgcaactggccgaccactaccagcagaacacgcggatcgcc
tggccctgtccgtccggacaaccattactgttccacgcaacttgccttccaaggaccacacgagaagagggaccatgtgtctgttgg
attcgtgacggcgtctggatcacgcatacgcatggatggacttcaagtga
atg ggc aag ggc gag gaa ctg ttc act ggc gtg gtc cca atc ctg gtg gaa ctg atg tga
M G K G E E L F T G V V P I L V E L M -
tgt gaa cgg gca caa gtt ctc cgt cag cgg aga ggg tga agg tga tgc cac cta cgg aaa
C E R A Q V L R Q R R G - R - C H L R K
gct cac cct gaa gtt cat ctg cac tac cgg aaa gct ccc tgt tcc gtg gcc aac cct cgt
A H P E V H L Y R K A P C S V A N P R
cac cac ttt cac cta cgg tgt tca gtg ctt ctc ccg gta ccc aga tca cat gaa gca gca
H H F H L R C S V L I P V P R S H E A A

```

tga ctt ctt caa gag cgc cat gcc cga agg cta cgt gca aga aag gac tat ctt ctt caa
 - L L Q E R H A R R L R A R K D Y L L Q
 gga tga cggtt gaa cta caa gac acg tgc cga agt caa gtt cga agg tga tac cct ggt gaa
 G - R E L Q D T C R S Q V R R - Y P G E
 ccg cat cga gct gaa agg tat cga ttt caa gga aga tgg aaa cat cct cgg aca caa gct
 P H R A E R Y R F Q G R W K H P R T Q A
 gga gta caa cta caa ctc cca caa cgt ata cat cat ggc cga caa gca gaa gaa cgg cat
 G V Q L Q L P Q R I H H G R Q A E E R H
 caa ggt gaa ctt caa gat cag gca caa cat cga aga tgg aag cgt gca act ggc gga cca
 O G E L Q D O A O H R R W K R A T G G P
 cta cca gca gaa cac gcc cat cgg cga tgg ccc tgt cct gct gcc gga caa cca tta cct
 L P A E H A H R R W P C P A A G Q P L P
 gtc cac gca atc tgc cct ctc caa gga ccc caa cga gaa gag gga cca cat ggt cct gct
 V H A I C P L Q G P Q R E E G P H G P A
 gga gtt cgt gac ggc tgc tgg gat cac gca tgg cat gga tga act cta caa gtg
 G V R D G C W D H A W H G - T L Q V

EC4 co-transforming event: biallelic

Allele 1: deletion of G

Atggcaaggcgaggactgttactggcggtccaaatctggtaactggatggatgtatgtgaacggcacaagttctccgtcagcgaga
 gggtaagggtatgccacctacggaaagctcacctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctcgtcaccactt
 tcacctacgggtttcagtgttcccggtacccagatcacatgaagcagcatgacttcttcaagagcgcctatgcccgaaggctacgtcaagaa
 aggactatcttcaaggatgacggaaactacaagacacgtgccaagtcaagttcaaggtgataccctggtaaccgcacatcgagctgaaagg
 tatcgatttcaaggaaatgacatcctcgacacaactgatggactacaactacccacaacgtatacatcatggccgacaacgagaaga
 acggcatcaagggtgaaacttcaaggatcaggcacaacatcgaagatggaaggctgcaacttggccgaccactaccaggcagaacacgcccacatcgccgat
 ggccctgtcctgtccggacaaccattacctgtccacgcaatctggcccttccaaaggaccaccaacgagaagagggaccacatggccctgtccgtgg
 gttcgtgacggctgtccggatcaggcatggatgacttacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gt	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G	
gat	tga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg	gaa	
D	-	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E	
agc	tca	ccc	tga	agt	tca	tct	tca	ccg	gaa	agc	tcc	ctg	ttc	ctg	ggc	caa	ccc	tcg		
S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S	
tca	cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc	agc	
S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S	
atg	act	tct	tca	aga	gct	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	gga	cta	tct	tct	tca	
M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S	
agg	atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtg	ata	ccc	tgg	tga	
R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-	
acc	gca	tcc	tcg	agc	tga	aag	gtt	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca	agc
T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S	
tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca	
W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A		
tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tcc	aag	atg	gaa	gct	tgc	aac	tgg	ccg	acc	
S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T	
act	acc	agc	aga	aca	cgc	cca	tcg	gct	atg	gcc	ctg	tcc	tgc	tgc	ccg	aca	acc	att	acc	
T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T	
tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc	
C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C	
tgg	agt	tcc	tga	ccg	ctg	gta	cgc	atg	gca	tgg	atg	aac	tct	aca	agt					
W	S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S			

Allele 2: insertion of A

Atggcaaggcgaggactgttactggcggtccaaatctggtaactggatggatgtatgtaaacggcacaagttctccgtcagcgag
 agggttaagggtatgccacctacggaaagctcacctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctcgtcaccactt
 tcacctacgggtttcagtgttcccggtacccagatcacatgaagcagcatgacttcttcaagagcgcctatgcccgaaggctacgtcaagaa
 aggactatcttcaaggatgacggaaactacaagacacgtgccaagtcaagttcaaggtgataccctggtaaccgcacatcgagctgaaagg
 gtatcgatttcaaggaaatgacatcctcgacacaactgatggactacaactacccacaacgtatacatcatggccgacaacgagaaga
 acggcatcaagggtgaaacttcaagatcaggcacaacatcgaagatggaaggctgcaacttggccgaccactaccaggcagaacacgcccacatcgccgat
 tgccctgtcctgtccggacaaccattacctgtccacgcaatctggcccttccaaaggaccaccaacgagaagagggaccacatggccctgtccgtgg
 agttcgtgacggctgtccggatcaggcatggatgacttacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gt	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G	
gat	tga	gaa	cg	gca	caa	gtt	ctc	cgt	cag	cg	aga	ggg	tga	agg	tga	tgc	cac	cta	cgg	
D	V	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	
aaa	gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cg	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct	
K	A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	
cgt	cac	cac	tcc																	
R	H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	
gca	tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aa	gac	tat	ctt	ctt	
A	-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	
caa	gga	tga	ccg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	ggt	
Q	G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	
gaa	ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cgg	aca	caa	
E	P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	
gct	gga	gta	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	cgg	

A	G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R
cat	caa	ggg	gaa	ctt	caa	gat	cag	gca	caa	cat	cga	aga	tgg	aag	cgt	gca	act	ggc	gga
H	Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G
cca	cta	cca	gca	gaa	cac	gcc	cat	cgg	cga	tgg	ccc	tgt	cct	gct	gcc	gga	caa	cca	tta
P	L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L
cct	gtc	cac	gca	atc	tgc	cct	ctc	caa	gga	ccc	caa	cga	gaa	gag	gga	cca	cat	ggt	cct
P	V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P
gct	gga	gtt	cgt	gac	ggc	tgc	tgg	gat	cac	gca	tgg	cat	gga	tga	act	cta	caa	gtg	
A	G	V	R	D	G	C	W	D	H	A	W	H	G	-	T	L	Q	V	

EC5 co-transforming event: biallelic

Allele 1: deletion of G

Atggggcaaggcgaggactgttactggcggtggccaaatctggggactggatggatgtat**G**tgaa~~gggg~~cacaagttctccgtcagcggaga
gggtgaagggtatggccacacctacggaaagctcacccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctcgtcaccactt
tcacacctacgggttcatctccggataccaggatcacatgaagcagcatgacttcttcaagagacgcccattccggaaaggctacgtgcaagaa
aggactatcttcttcaaggatgacggaaactacaagacacgtgcccgaagtcaaggatcgaaaggatccctgttgcaccatcgagctgaaaagg
tatcgatttcaaggaaatggaaacatctccggacacaagactggagttacaactacaactccacaacgtatacatatcatggccgacaacgagaaga
acggcatcaaggtaacttcaagatcaggcacaacatcgaaatggatggcgatggccactaccaggcagaacacgcccattccggat
ggccctgttccgttgcggacaaccattaccctgttccacgcaatctggccctctccaaaggaccaccaacgagaagagggaccatggccctgttgc
gttgcgtgacggctgtggatcacgcatggcatggatactacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gtt	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	tga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg	gaa
D	-	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E
agc	tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctg	ttc	cgt	ggc	caa	ccc	tcg
S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S
tca	cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc	agc
S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S
atg	act	tct	tca	aga	ggc	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	gga	cta	tct	tct	tca
M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S
agg	atg	acg	ggg	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtg	ata	ccc	tgg	tga
R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-
acc	gca	tgc	agc	tga	aag	gta	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca	agc
T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S
tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca
W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A	
tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tcg	aag	atg	gaa	gcg	tgc	aac	tgg	ccg	acc
S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T
act	acc	agc	aga	aca	cgc	cca	tcg	gcg	atg	gcc	tcg	tcc	tgc	tgc	ccg	aca	acc	att	acc
T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T
tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc
C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C
tgg	agt	tgc	tga	ccg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aac	tct	aca	agt		
W	S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S		

Allele 2: deletions of GT

Atggggcaaggcgaggactgttactggcggtggccaaatctggggactggatggatgtat**GT**tgaa~~gggg~~cacaagttctccgtcagcggag
gggtgaagggtatggccacacctacggaaagctcacccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctcgtcaccact
tcacacctacgggttcatctccggataccaggatcacatgaagcagcatgacttcttcaagagacgcccattccggaaaggctacgtgcaagaa
aggactatcttcttcaaggatgacggaaactacaagacacgtgcccgaagtcaaggatgtatccctgttgcaccatcgagctgaaaag
gtatcgatttcaaggaaatggaaacatctccggacacaacatcgaaatgttacaactacaactccaccaacgtatacatatcatggccgacaacgagaag
acggcatcaaggtaacttcaagatcaggcacaacatcgaaatgttacaactaccaggcagaacacgcccattccggat
ggccctgttccgttgcggacaaccattaccctgttccacgcaatctggccctctccaaaggaccaccaacgagaagagggaccacatggccctgttgc
gttgcgtgacggctgtggatcacgcatggcatggatactacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gtt	ggt	
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G	
gat	gaa	cg	gca	caa	gtt	ctc	cg	cag	cg	aga	ggg	tga	agg	tga	tgc	cac	cta	cg	aaa	
D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	K	
gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cg	aaa	gct	ccc	tgt	tcc	gt	gcc	aac	cct	cg	
A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	R	
cac	cac	ttt	cac	cta	cg	tgt	tca	gt	gt	ttt	ctc	ccg	gt	ccc	aga	tca	cat	gaa	gca	
H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	A	
tga	ctt	ctt	caa	gag	cg	cg	cat	gg	cg	agg	cta	tgt	ca	ga	aa	gac	tat	ctt	caa	
-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	Q	
gga	tga	cg	gaa	cta	caa	gac	acg	tgc	cg	agt	caa	gtt	cg	aa	gg	tga	tac	cct	ggt	gaa
G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	E	
ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cg	aca	caa	gct	
P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	A	
gga	gt	aa	cta	caa	ctc	cc	ca	cgt	ata	cat	cat	ggc	cg	aa	gca	gaa	gaa	cg	cat	
G	V	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	E	R	R	H	
caa	ggt	gaa	ctt	caa	gat	cag	gca	caa	cat	cga	aga	tgg	aa	gag	cgt	gca	act	ggc	gga	
Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G	P	
cta	cca	gca	gaa	cac	gcc	cat	cgg	cga	tgg	ccc	tgt	cct	gct	gct	gca	caa	cca	tta	cct	
L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L	P	
gtc	cac	gca	atc	tgc	cct	ctc	caa	gga	ccc	caa	cga	gaa	gag	gga	cca	cat	ggt	cct	gct	
V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P	A	

gga gtt cgt gac ggc tgc tgg gat cac gca tgg cat gga tga act cta caa gtg
 G V R D G C W D H A W H G - T L Q V

EC6 co-transforming event: biallelic

Allele 1: deletion of TG

Atggcaaggcgaggaactgttactggctggccatctggtggaactggatggatgt**TG**aacggcacaagttctccgtcagcggag
 agggtaaggatgtatgccacctaaggaaagctcaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctcgtaaccact
 ttcacctacggtgttactgtctcccgtaaccagatcacatgaagcagcatgacttcaagagcgcctgcccggaaaggctacgtcaaga
 aaggactatcttcaggatgacggaaactacaagacacgtgccaactgtaaggatgataccctggtaaccactacaactcccaacgtatacat
 gtatcgattcaaggaaatggaaacatccctggacacaactgtaaggatgataccctggtaaccactacaactcccaacgtatacat
 aacggcatcaaggatgttcaaggatcaggcacaatcgtaagatgaaacgtgcaactggggaccactaccaggcagaacacgccccatggcga
 tggccctgtcctgtccggacaaccattacctgtccacgcaatctccctcaaggaccaccaacgagaagagggaccacatgtcctgtcc
 atgttgcgtacggctgtggatcacgcacatggatgtactacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gt	gat	gg
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	I	L	D	G
gat	gaa	cgg	gca	caa	gtt	ctc	cgt	cag	cgg	aga	ggg	tga	agg	tga	tgc	cac	cta	cgg	aaa	
D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	K	
gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cgg	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct	cgt	
A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	R	
cac	cac	ttt	cac	cta	cgg	tgt	tca	gtg	ctt	ctc	ccg	gta	ccc	aga	tca	cat	gaa	gca	gca	
H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	A	
tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aag	gac	tat	ctt	ctt	caa	
-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	Q	
gga	tga	cgg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	gg	gaa	
G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	E	
ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cg	aca	caa	gct	
P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	A	
gga	gta	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	cg	cat	
G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R	H	
caa	ggt	gaa	ctt	caa	gat	cag	gca	caa	cat	cga	aga	tgg	aa	g	cgt	gca	act	ggc	gga	
Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G	P	
cta	cca	gca	gaa	cac	gcc	cat	cgg	cga	tgg	ccc	tgt	cct	gct	gcc	gga	caa	cca	tta	cct	
L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L	P	
gtc	cac	gca	atc	tgc	cct	ctc	caa	gga	ccc	caa	cga	gaa	gag	gga	cca	cat	ggt	cct	gct	
V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P	A	
gga	gtt	cgt	gac	ggc	tgc	tgg	gat	cac	gca	tgg	cat	gga	tga	act	cta	caa	gt	g		
G	V	R	D	G	C	W	D	H	A	W	H	G	-	T	L	Q	V			

Allele 2: insertion of T

Atggcaaggcgaggaactgttactggctggccatctggtggaactggatggatgt**T**tgaaacggcacaagttctccgtcagcggag
 agggtaaggatgtatgccacctaaggaaagctcaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctcgtaaccact
 ttcacctacggtgttactgtctcccgtaaccagatcacatgaagcagcatgacttcaagagcgcctgcccggaaaggctacgtcaaga
 aaggactatcttcaggatgacggaaactacaagacacgtgccaactgtaaggatgataccctggtaaccactacaactcccaacgtatacat
 gtatcgattcaaggaaatggaaacatccctggacacaactgtaaggatgataccctggtaaccactacaactcccaacgtatacat
 aacggcatcaaggatgttcaaggatcaggcacaatcgtaagatgaaacgtgcaactggggaccactaccaggcagaacacgccccatggcga
 tggccctgtcctgtccggacaaccattacctgtccacgcaatctccctctcaaggaccaccaacgagaagagggaccacatgtcctgtcc
 atgttgcgtacggctgtggatcacgcacatggatgtactacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gt	gat	gg
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	I	L	D	G
gat	gtt	gaa	cgg	gca	caa	gtt	ctc	cgt	cag	cgg	aga	ggg	tga	agg	tga	tgc	cac	cta	cgg	
D	V	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	
aaa	gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cgg	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct	
K	A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	
cgt	cac	cac	ttt	cac	cta	cgg	tgt	tca	gtg	ctt	ctc	ccg	gta	ccc	aga	tca	cat	gaa	gca	
R	H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	
gca	tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aag	gac	tat	ctt	ctt	
A	-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	
caa	gga	tga	cgg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	gg	
Q	G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	
gaa	ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cg	aca	caa	
E	P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	
gct	gga	gta	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	cg	
A	G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R	
cat	caa	ggt	gaa	ctt	caa	gat	cag	gca	caa	cat	cga	aga	tgg	aag	cgt	gca	act	ggc	gga	
H	Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G	
cca	cta	cca	gca	gaa	cac	gcc	cat	cgg	cga	tgg	ccc	tgt	cct	gct	gcc	gga	caa	cca	tta	
P	L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L	
cct	gtc	cac	gca	atc	tgc	cct	ctc	caa	gga	ccc	caa	cga	gaa	gag	gga	cca	cat	ggt	cct	
P	V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P	
gct	gga	gtt	cgt	gac	ggc	tgc	tgg	gat	cac	gca	tgg	cat	gga	tga	act	cta	caa	gt	g	
A	G	V	R	D	G	C	W	D	H	A	W	H	G	-	T	L	Q	V		

EC7 co-transforming event: monoallelic

Allele 1: no indels

Atggcaaggcgaggaactgttactggctggccatctggtggaactggatggatgt**tg**tgaaacggcacaagttctccgtcagcggaga
 gggtaaggatgtatgccacctaaggaaagctcaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaaccctcgtaaccactt

tcacctacgggtttcagtgcctccggatccccagatcacatgaaggcatgacttctcaagagcgccatgcccgaaggctacgtgcaagaa
aggactatcttcaggatgacggaaactacaagacacgtgccaaagtcaaggtaaccctggataccctggtaaccgcacgactgaaagg
tatcgattcaaggaaagatggaaacatcctcgacacaagctggagatacaactacaactccacaacgtatacatcatggccgacaacgagaaga
acggcatcaaggtaactcaagatcaggcacaacatcgaagatggaaaggcatgcaactggcgaccactaccaggcagaacacgcccacatggcgat
ggccctgtctgctggatcaccatggcatggactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	aat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gtg	aac	ggg	cac	aag	ttc	tcc	gtc	agc	gga	gag	ggt	gaa	ggt	gat	gcc	acc	tac	gga
D	V	N	G	H	K	F	S	V	S	G	E	G	E	G	D	A	T	Y	G
aag	ctc	acc	ctg	aag	ttc	atc	tgc	act	acc	gga	aag	ctc	cct	gtt	ccg	tgg	cca	acc	ctc
K	L	T	L	K	F	I	C	T	T	G	K	L	P	V	P	W	P	T	L
gtc	acc	act	ttc	acc	tac	ttc	gtt	cag	tgc	ttc	tcc	ccg	tac	cca	gat	cac	atg	aag	cag
V	T	T	F	T	Y	G	V	Q	C	F	S	R	Y	P	D	H	M	K	Q
cat	gac	ttc	ttc	aag	agc	gcc	atg	ccc	gaa	ggc	tac	gtg	caa	gaa	agg	act	atc	ttc	tcc
H	D	F	F	K	S	A	M	P	E	G	Y	V	Q	E	R	T	I	F	F
aag	gat	gac	ggg	aac	tac	aag	aca	cgt	gcc	gaa	gtc	aag	ttc	gaa	ggt	gat	acc	ctg	gtg
K	D	D	G	N	Y	K	T	R	A	E	V	K	F	E	G	D	T	L	V
aac	cgc	atc	gag	ctg	aaa	ggt	atc	gtt	aag	gaa	gat	gga	aac	atc	ctc	gga	cac	aag	
N	R	I	E	L	K	G	I	D	F	K	E	D	G	N	I	L	G	H	K
ctg	gag	tac	aac	tac	aac	tcc	cac	aac	gtt	tac	atc	atg	gcc	gac	aag	cag	aag	aac	ggc
L	E	Y	N	Y	N	S	H	N	V	Y	I	M	A	D	K	Q	K	N	G
atc	aag	gtg	aac	ttc	aag	atc	agg	cac	aac	atc	gaa	gat	gga	agc	gtg	caa	ctg	gac	gac
I	K	V	N	F	K	I	R	H	N	I	E	D	G	S	V	Q	L	A	D
cac	tac	cag	cag	aac	acg	ccc	atc	ggc	gat	ggc	cct	gtc	gtc	ctg	ccg	gac	aac	cat	tac
H	Y	Q	Q	N	T	P	I	G	D	G	P	V	L	L	P	D	N	H	Y
ctg	tcc	acg	caa	tct	ggc	ctc	tcc	aag	gac	ccc	aac	gag	aag	agg	gac	cac	atg	gtc	ctg
L	S	T	Q	S	A	L	S	K	D	P	N	E	K	R	D	H	M	V	L
ctg	gag	ttc	gtg	acg	gct	gct	ggg	atc	acg	cat	ggc	atg	gat	gaa	ctc	tac	aag	tga	
L	E	F	V	T	A	A	G	I	T	H	G	M	D	E	L	Y	K	-	

Allele 2: deletion of TG

Atgggcaaggcgaggaaactgttcaactggcggtggatccatctggtaactggatggatgtg**TG**aacgggcacaagttctccgtcagcgagg
agggtgaagggtatggccacccatcgaaagctcaccctgaagttcatctgcactaccggaaagctccctgtccgtggccaaaccctcgtaaccact
ttcacctacgggtttcagtgcctcccggtacccagatcacatgaaggcatgacttctcaagagcgccatgcccgaaggctacgtgcaagaa
aggactatcttcaggatgacggaaactacaagacacgtgccaaagtcaagttcgtaaggatgataccctggtaaccgcacgactgcaaga
gtatcgattcaaggaagatggaaacatcctcgacacaagctggagatacaactacaactccacaacgtatacatcatggccgacaacgagaag
aacggcatcaaggtaactcaagatcaggcacaacatcgaagatggaaaggcatgcaactggcgaccactaccaggcagaacacgcccacatggcg
tgccctgtctgctggatcaccatggcatggactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	aat	ggt	
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G	
gat	gaa	cg	gca	caa	gtt	ctc	cg	t	c	g	gg	t	g	t	g	c	ct	cg	aaa	
D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	K	
gct	cac	c	c	g	aa	gtt	cat	ctg	c	ac	tac	cg	aaa	gct	ccc	tgt	tcc	gt	cc	
A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	R	
cac	cac	t	t	t	cac	cta	cg	tgt	tca	gt	gt	ctt	cc	gt	cc	aga	tca	cat	gaa	gca
H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	A	
tga	ctt	ctt	caa	gag	cg	cg	cat	gg	c	ga	agg	cta	tat	gtt	ctt	caa	-	L	Q	
-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	Q	
gga	tga	cg	gaa	cta	caa	gac	ac	tg	c	ga	gt	tt	cgt	cg	agg	tga	tac	cct	ggt	
G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	E	
ccg	cat	c	g	aa	g	gg	tt	caa	g	ga	aa	tgg	aaa	cat	cct	cg	aca	caa	gct	
P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	A	
gga	gta	caa	cta	caa	ctc	cc	ca	cgt	ata	cat	cat	ggc	cg	caa	gca	gaa	gaa	cg	cat	
G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R	H	
caa	gg	tt	caa	gat	cag	g	ca	aa	cat	c	ga	aa	tgg	aag	cgt	gca	act	ggc	cca	
Q	G	E	L	Q	D	Q	A	Q	H	R	R	W	K	R	A	T	G	G	P	
cta	cca	g	ca	aa	cac	gg	cc	at	cg	cg	tgg	ccc	tgt	ctt	gct	g	cc	tta	cct	
L	P	A	E	H	A	H	R	R	W	P	C	P	A	A	G	Q	P	L	P	
gtc	cac	g	ca	atc	tgc	c	tc	caa	gg	cc	aa	c	ga	aa	gag	gg	cc	at	gtt	
V	H	A	I	C	P	L	Q	G	P	Q	R	E	E	G	P	H	G	P	A	
gga	gtt	cgt	g	ac	gg	tc	gg	tgg	gat	cac	g	ca	tgg	cat	g	aa	ct	aa	gt	
G	V	R	D	G	C	W	D	H	A	W	H	G	-	T	L	Q	V			

EC8 co-transforming event: monoallelic

Allele 1: deletion of T

Atgggcaaggcgaggaaactgttcaactggcggtggatccatctggtaactggatggatgtg**TG**aacgggcacaagttctccgtcagcgaga
gggtgaagggtatggccacccatcgaaagctcaccctgaagttcatctgcactaccggaaagctccctgtccgtggccaaaccctcgtaaccact
ttcacctacgggtttcagtgcctcccggtacccagatcacatgaaggcatgacttctcaagagcgccatgcccgaaggctacgtgcaagaa
aggactatcttcaggatgacggaaactacaagacacgtgccaaagtcaaggtaaccctggataccctggtaaccgcacgactgcaaga
tatcgattcaaggaaagatggaaacatcctcgacacaagctggagatacaactacaactccacaacgtatacatcatggccgacaacgaga
acggcatcaaggtaactcaagatcaggcacaacatcgaagatggaaaggcatgcaactggcgaccactaccaggcagaacacgcccacatggcg
tgccctgtctgctggatcaccatggcatggactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	I	D	G
gat	gga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg	gaa
D	G	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E
agc	tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctt	ctg	gtc	caa	ccc	tcc	tgc
S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S
tca	cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc	agc
S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S
atg	act	tct	tca	aga	gcg	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	gga	cta	tct	tct	tca
M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S
agg	atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtg	ata	ccc	tgg	tga
R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-
acc	gca	tgc	aggc	tga	aag	gta	tgc	att	tca	agg	aag	atg	gaa	aca	tcc	tgc	gac	aca	agc
T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S
tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca
W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A	
tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tgc	aag	atg	gaa	gca	tgg	cg	acc	tgg	cg
S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T
act	acc	acg	aga	aca	cgc	cca	tgc	gcg	atg	gcc	ctg	tcc	tgc	tgc	cgg	aca	acc	att	acc
T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T
tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc
C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C
tgg	agt	tcg	tga	cgg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aac	tct	aca	agt		
W	S	S	-	R	L	L	G	S	R	M	A	W	M	M	N	S	T	S	

Allele 2: no indels

Atgggcggccggggcgaggaaactgttcaactggcgtggtcccaatctggtgaaactggatggtgatgtgaacggcacaagttccgtcagcggaga
gggtgaaggtgatgcacccatcggaaagctaccctgaagttcatctgcactaccggaaagtcctgtccgtggccaaaccctgtcaccactt
tcacccatcggttcaagtgttcccgatcacatgaagcagcatgacttccaagagccatgcccggaaaggctacgtcaagaa
aggactatcttccaaggatgcggaaactacaagacacgtccggaaagtcaagttcaaggtgataccctggtaaccgcacatcgagctgaaagg
tatcgattcaaggaaagatggaaacatctccggacacaacatcggtggagatacaactccacaatcgatatacatcatggccgacaaagcagaagg
acggcatcaaggtgaacttcaagatcaggcacaacatcgaagatggaaagcgtgcaactggccggaccactaccagcagaacacgcggccatggcgat
ggccctgtctgtggccggacaaccattacctgtccacgcaatctggccctctccaaggaccaccaacgagaagaggggaccacatggcctgtgg
gttcgtgacggctgtggatcagcatggcatggatgaactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gtg	aac	ggg	cac	aag	ttc	tcc	gtc	agc	gga	gag	ggg	gaa	ggg	gat	gcc	acc	tac	gga
D	V	N	G	H	K	F	S	V	S	G	E	G	E	G	D	A	T	Y	G
aag	ctc	acc	ctg	aag	ttc	atc	tgc	act	acc	gga	aag	ctc	cct	gtt	ccg	tgg	cca	acc	ctc
K	L	T	L	K	F	I	C	T	T	G	K	L	P	V	P	W	P	T	L
gtc	acc	act	ttc	acc	tac	ggt	gtt	cag	tgc	ttc	tcc	cg	tac	cca	gat	cac	atg	aag	cag
V	T	T	F	T	Y	G	V	Q	C	F	S	R	Y	P	D	H	M	K	Q
cat	gac	ttc	ttc	aag	agc	gcc	atg	ccc	gaa	ggc	tac	gtg	caa	gaa	agg	act	atc	ttc	ttc
H	D	F	F	K	S	A	M	P	E	G	Y	V	Q	E	R	T	I	F	F
aag	gat	gac	ggg	aac	tac	aag	aca	cgt	gcc	gaa	gtc	aag	ttc	gaa	ggg	gt	acc	ctg	gtg
K	D	D	G	N	Y	K	T	R	A	E	V	K	F	E	G	D	T	L	V
aac	cgc	atc	gag	ctg	aaa	gg	atc	gat	ttc	aag	gaa	gat	gga	aac	atc	ctc	gga	cac	aag
N	R	I	E	L	K	G	I	D	F	K	E	D	G	N	I	L	G	H	K
ctg	gag	tac	aac	tac	aac	tcc	cac	aac	gta	tac	atc	atg	gcc	gac	aag	cag	aag	aac	ggc
L	E	Y	N	Y	N	S	H	N	V	Y	I	M	A	D	K	Q	K	N	G
atc	aag	gtg	aac	ttc	aag	atc	agg	cac	aac	atc	gaa	gat	gga	agc	gtg	caa	ctg	g	gac
I	K	V	N	F	K	I	R	H	N	I	E	D	G	S	V	Q	L	A	D
cac	tac	cag	cag	aac	acg	ccc	atc	ggc	gat	ggc	cct	gtc	ctg	ctg	ccg	gac	aac	cat	tac
H	Y	Q	Q	N	T	P	I	G	D	G	P	V	L	L	P	D	N	H	Y
ctg	tcc	acg	caa	tct	gcc	ctc	tcc	aag	gac	ccc	aac	gag	aag	agg	gac	cac	atg	gtc	ctg
L	S	T	Q	S	A	L	S	K	D	P	N	E	K	R	D	H	M	V	L
ctg	gag	ttc	gtg	acg	gct	gct	ggg	atc	acg	cat	ggc	atg	gat	gaa	ctc	tac	aag	tga	
L	E	F	V	T	A	A	G	I	T	H	G	M	D	E	L	Y	K	-	

EC9 co-transforming event: monoallelic

Allele 1: no indels

Atgggcaggcgaggaactgttcaactggcgtggccaaatctgggaaactggatgtgaacggcacaagttccgtcgccggaga
gggtgaagggtgatgcacacctacggaaagctaccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctgtcaccactt
tcacctacggtgttcaagtgttcccgtacccagatcacatgaagcagcatgactcttcaagagccatgcccgaaggctacgtcaagaa
aggactatcttcccaaggatgcggaaactacaagacgcgtccgaaggtcaagttcaagcttccgtggtaaccgcacatcgagctgaagg
tatcgatttcaaggaaagatggaaacatcctcgccgacacaactgcgtggatcaactccacaacgtatacatcatggccgacaaagcagaaga
acggcatcaaggtaacttcaagatcaggcacaacatcgaagatggaaagcgtcaactggcggaccactcaggcagaacacgcacccatcgccgat
ggccctgtctgtccggacaaccattacctgtccacgcatactggccctctccaaggacccaaacgagaagagggaccacatggctctgttgg
gttcgtgacggctgtggatcagcatggatgaactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	gg	
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G	
gat	gtg	aac	ggg	cac	aag	ttc	tcc	gtc	agc	gga	gag	gg	gaa	gg	gt	gat	gcc	acc	tac	gga
D	V	N	G	H	K	F	S	V	S	G	E	G	E	G	D	A	T	Y	G	
aag	ctc	acc	ctg	aag	ttc	atc	tgc	act	acc	gga	aag	ctc	cct	gtt	ccg	tgg	cca	acc	ctc	
K	L	T	L	K	F	I	C	T	T	G	K	L	P	V	P	W	P	T	L	
gtc	acc	act	ttc	acc	tac	gg	gtt	cag	tgc	ttc	tcc	cg	tac	cca	gt	cac	atg	aag	cag	
V	T	T	F	T	Y	G	V	Q	C	F	S	R	Y	P	D	H	M	K	Q	
cat	gac	ttc	ttc	aag	agc	gcc	atg	ccc	gaa	ggc	tac	gtg	caa	gaa	agg	act	atc	ttc	ttc	

H	D	F	F	K	S	A	M	P	E	G	Y	V	Q	E	R	T	I	F	F
aag	gat	gac	ggg	aac	tac	aag	aca	cgt	gcc	gaa	gtc	aag	ttc	gaa	ggt	gat	acc	ctg	gtg
K	D	D	G	N	Y	K	T	R	A	E	V	K	F	E	G	D	T	L	V
aac	cgc	atc	gag	ctg	aaa	ggt	atc	gat	ttc	aag	gaa	gat	gga	aac	atc	ctc	gga	cac	aag
N	R	I	E	L	K	G	I	D	F	K	E	D	G	N	I	L	G	H	K
ctg	gag	tac	aac	tac	aac	tcc	cac	aac	gta	tac	atc	atg	gcc	gac	aag	cag	aag	aac	ggc
L	E	Y	N	Y	N	S	H	N	V	Y	I	M	A	D	K	Q	K	N	G
atc	aag	gtg	aac	ttc	aag	atc	agg	cac	aac	atc	gaa	gat	gga	agc	gtg	caa	ctg	gcg	gac
I	K	V	N	F	K	I	R	H	N	I	E	D	G	S	V	Q	L	A	D
cac	tac	cag	cag	aac	acg	ccc	atc	ggc	gat	ggc	cct	gtc	ctg	ctg	ccg	gac	aac	cat	tac
H	Y	Q	Q	N	T	P	I	G	D	G	P	V	L	L	P	D	N	H	Y
ctg	tcc	acg	caa	tct	gcc	ctc	tcc	aag	gac	ccc	aac	gag	aag	agg	gac	cac	atg	gtc	ctg
L	S	T	Q	S	A	L	S	K	D	P	N	E	K	R	D	H	M	V	L
ctg	gag	ttc	gtg	acg	gct	gct	ggg	atc	acg	cat	ggc	atg	gat	gaa	ctc	tc	aag	tga	-
L	E	F	V	T	A	A	G	I	T	H	G	M	D	E	L	Y	K	-	

Allele 2: deletion of TG

Atggccaaggcgaggactgttactggcggtggccatctgggggaactggatggatgatg **TG** aacgggcacaagttctccgtcagcggag
 agggtgaagggtatgccacctaaggaaagctcaccctgaagttcatctgactaccggaaagctccctgttccgtggccaaaccctctgtcaccact
 ttcacctacgggtttcagtgtcttcccgtaaccagatcacatgaagcagcatgacttcttcaagagccatgcccgaaggctacgtcaaga
 aaggactatcttcttcaaggatgacggaaactacaagacacgtgccaagtcaagttcgaaagggtataccctggtaaccgcacatcgagctgaa
 gtatcgatttcaaggaaggatggaaacatcctcgacacaaggatcgaggactacaactcccacaacgtatacatcatggccgacaaggaga
 aacggcatcaagggtgaacttcaagatcaggcacaacatcgaagatgaaacgtgcaactggccgaccactaccaggcagaacacgc
 cccatcgccgatggccgaccaaccattacgttccacgcaatctccctctccaaggaccacatggatgaaaggaggaccatgtcctgctgg
 atttcgatggctgtggatcacgcacatggatgaaactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	aat	
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	aaa	cg	gca	caa	gtt	ctc	cg	t	cag	cg	aga	ggg	tga	agg	tga	tgc	cac	cta	cg
D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	K
gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cg	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct	cg
A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	R
cac	cac	ttt	cac	cta	cg	tgt	tca	gtg	ctt	ctc	ccg	gta	ccc	aga	tca	cat	gaa	gca	gca
H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	A
tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aag	gac	tat	ctt	caa	
-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	Q
gga	tga	cg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	gg	
G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	E
ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cg	aca	caa	gct
P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	A
gga	tga	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	cg	
G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R	H

EC10 co-transforming event: biallelic

Allele 1: deletions of TG

Atggccaaggcgaggactgttactggcggtggccatctgggggaactggatggatgatg **TG** aacgggcacaagttctccgtcagcggag
 agggtgaagggtatgccacctaaggaaagctcaccctgaagttcatctgactaccggaaagctccctgttccgtggccaaaccctctgtcaccact
 ttcacctacgggtttcagtgtcttcccgtaaccagatcacatgaagcagcatgacttcttcaagagccatgcccgaaggctacgtcaaga
 aaggactatcttcttcaaggatgacggaaactacaagacacgtgccaagtcaagttcgaaagggtataccctggtaaccgcacatcgagctgaa
 gtatcgatttcaaggaaggatggaaacatcctcgacacaaggatcgaggactacaactcccacaacgtatacatcatggccgacaaggaga
 aacggcatcaagggtgaacttcaagatcaggcacaacatcgaagatgaaacgtgcaactggccgaccactaccaggcagaacacgc
 cccatcgccgatggccgaccaaccattacgttccacgcaatctccctctccaaggaccacatggatgaaaggaggaccatgtcctgctgg
 agttcgatggctgtggatcacgcacatggatgaaactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	aat	
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	aaa	cg	gca	caa	gtt	ctc	cg	t	cag	cg	aga	ggg	tga	agg	tga	tgc	cac	cta	cg
D	E	R	A	Q	V	L	R	Q	R	R	G	-	R	-	C	H	L	R	K
gct	cac	cct	gaa	gtt	cat	ctg	cac	tac	cg	aaa	gct	ccc	tgt	tcc	gtg	gcc	aac	cct	cg
A	H	P	E	V	H	L	H	Y	R	K	A	P	C	S	V	A	N	P	R
cac	cac	ttt	cac	cta	cg	tgt	tca	gtg	ctt	ctc	ccg	gta	ccc	aga	tca	cat	gaa	gca	gca
H	H	F	H	L	R	C	S	V	L	L	P	V	P	R	S	H	E	A	A
tga	ctt	ctt	caa	gag	cgc	cat	gcc	cga	agg	cta	cgt	gca	aga	aag	gac	tat	ctt	caa	
-	L	L	Q	E	R	H	A	R	R	L	R	A	R	K	D	Y	L	L	Q
gga	tga	cg	gaa	cta	caa	gac	acg	tgc	cga	agt	caa	gtt	cga	agg	tga	tac	cct	gg	
G	-	R	E	L	Q	D	T	C	R	S	Q	V	R	R	-	Y	P	G	E
ccg	cat	cga	gct	gaa	agg	tat	cga	ttt	caa	gga	aga	tgg	aaa	cat	cct	cg	aca	caa	gct
P	H	R	A	E	R	Y	R	F	Q	G	R	W	K	H	P	R	T	Q	A
gga	tga	caa	cta	caa	ctc	cca	caa	cgt	ata	cat	cat	ggc	cga	caa	gca	gaa	gaa	cg	
G	V	Q	L	Q	L	P	Q	R	I	H	H	G	R	Q	A	E	E	R	H

```

caa ggt gaa ctt caa gat cag gca caa cat cga aga tgg aag cgt gca act ggc gga cca
Q   G   E   L   Q   D   Q   A   Q   H   R   R   W   K   R   A   T   G   G   P
ctt cca gca gaa cac gcc cat cgg cga tgg ccc tgt cct gct gcc gga caa cca tta ctc
L   P   A   E   H   A   H   R   R   W   P   C   P   A   A   G   Q   P   L   P
gtc cac gca atc tgc cct ctc caa gga ccc cca cga gaa gag gga cca cat ggt cct gct
V   H   A   I   C   P   L   Q   G   P   Q   R   E   E   G   P   H   G   P   A
gga gtt cgt gac ggc tgc tgg gat cac gca tgg cat gga tga act cta caa gtg
G   V   R   D   G   C   W   D   H   A   W   H   G   -   T   L   Q   V

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Allele 2: deletion of T

AtgggcgaggcgaggaactgttcaactggcgtggccaaatctggagaactggatggtgatgTgaacgggcacaagttcccgtagcggaga
gggtgaagggtgatgcacacctacggaaagctcacccctgaagttcatctgcactaccggaaagctccctgttccgtggccaaccctcgtcaccactt
tcacctacgggttcaagtgttcccgtacccagatcacatgaagcagcatgacttcttaagagccatgcccgaaggctacgtgcaagaa
aggactatcttcttaaggatgacggaaactacaagacacgtgcccgaagtcaagttcaagggtataccctggtaaccgcacatcgagctgaaagg
tatcgatctaaggaaatggaaacatctccggacacaactggactacaactcacaactccacatacatcgccgacaaacgaga
acggcatcaagggtgaaacttcaagatcaggcacaacatcgaagatggaaacgtgcaactggcggaccactaccaggcagaacacgc
ggccctgtcctgtccggacaaccattacctgtccacgcaatctggcccttccaaaggaccccaacgagaagagggaccacatggtccctgttca
gttgcgtgacggctgtggatcagcgtggcatggatgaactctacaagtga

atg	ggc	aag	ggc	gag	gaa	ctg	ttc	act	ggc	gtg	gtc	cca	atc	ctg	gtg	gaa	ctg	gat	ggt
M	G	K	G	E	E	L	F	T	G	V	V	P	I	L	V	E	L	D	G
gat	gga	acg	ggc	aca	agt	tct	ccg	tca	gcg	gag	agg	gtg	aag	gtg	atg	cca	cct	acg	gaa
D	G	T	G	T	S	S	P	S	A	E	R	V	K	V	M	P	P	T	E
agc	tca	ccc	tga	agt	tca	tct	gca	cta	ccg	gaa	agc	tcc	ctg	ttc	cgt	ggc	caa	ccc	tcg
S	S	P	-	S	S	S	A	L	P	E	S	S	L	F	R	G	Q	P	S
tca	cca	ctt	tca	cct	acg	gtg	ttc	agt	gct	tct	ccc	ggt	acc	cag	atc	aca	tga	agc	agc
S	P	L	S	P	T	V	F	S	A	S	P	G	T	Q	I	T	-	S	S
atg	act	tct	tca	aga	gcg	cca	tgc	ccg	aag	gct	acg	tgc	aag	aaa	gga	cta	tct	tct	tca
M	T	S	S	R	A	P	C	P	K	A	T	C	K	K	G	L	S	S	S
agg	atg	acg	gga	act	aca	aga	cac	gtg	ccg	aag	tca	agt	tcg	aag	gtg	ata	ccc	tgg	tga
R	M	T	G	T	T	R	H	V	P	K	S	S	S	K	V	I	P	W	-
acc	gca	tcg	agc	tga	aag	gtt	tcg	att	tca	agg	aag	atg	gaa	aca	tcc	tcg	gac	aca	agc
T	A	S	S	-	K	V	S	I	S	R	K	M	E	T	S	S	D	T	S
tgg	agt	aca	act	aca	act	ccc	aca	acg	tat	aca	tca	tgg	ccg	aca	agc	aga	aga	acg	gca
W	S	T	T	T	P	T	T	Y	T	S	W	P	T	S	R	R	T	A	
tca	agg	tga	act	tca	aga	tca	ggc	aca	aca	tgc	aag	atg	gaa	gcg	tgc	aac	tgg	cg	acc
S	R	-	T	S	R	S	G	T	T	S	K	M	E	A	C	N	W	R	T
act	acc	agc	aga	aca	cgc	cca	tcg	gct	atg	gcc	ctg	tcc	tgc	tgc	cg	aca	acc	att	acc
T	T	S	R	T	R	P	S	A	M	A	L	S	C	C	R	T	T	I	T
tgt	cca	cgc	aat	ctg	ccc	tct	cca	agg	acc	cca	acg	aga	aga	ggg	acc	aca	tgg	tcc	tgc
C	P	R	N	L	P	S	P	R	T	P	T	R	R	G	T	T	W	S	C
tgg	agt	tcg	tga	cgg	ctg	ctg	gga	tca	cgc	atg	gca	tgg	atg	aca	tct	aca	agt		
W	S	S	-	R	L	L	G	S	R	M	A	W	M	N	S	T	S		