SEQUENCES USED IN THE STUDY

- **Moloney Murine Leukemia Virus reverse transcriptase (MMLVrt) coding sequence (tobacco codon-optimized)**

  TCTGGAGGATCTAGCGGAGGATCCTCTGGGTCGGAAACACCAGGTACTAGCGAGTCAGCTACACCAGAGTCT
  AGTGGAGGCAGCAGCGGCGGGAGTAGCACACTAAATATAGAAGATGAATATCGGCTACATGAAACTTCAAA
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  ATCCCATGTCACAAGAAGCCAGATTAGGAATCAAGCCTCATATACAGAGACTGTTGGACCAGGGAATACTGG
  TACCCTGCCAGTCCCCTTGGAACACACCACTGCTACCCGTTAAGAAACCTGGTACTAATGATTATAGGCCTGTC
  CAAGATCTGAGAGAAGTCAATAAGCGTGTGGAAGATATTCACCCTACCGTGCCAAACCCTTACAACCTCTTGT
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  AGCCCTGGGTTTGCCAGATTTGACTAAGCCCTTTGAACTCTTTGTGGACGAGAAGCAAGGATACGCGAAAGG
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  GCTGGGTGGCCTCCTTGCCTAAGGATGGTAGCAGCCATTGCCGTACTGACAAAGGATGCCGGCAAGCTAACC
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  TTTCCAATGCGCGGATGACTCATTATCAGGCCTTACTTTTGGATACGGACCGGGTTCAGTTCGGACCGGTGGT
  AGCCTTAAACCCGGCTACGCTGTTACCACTGCCTGAGGAAGGACTACAACACAATTGTCTTGATATTTTAGCC
  GAAGCACACGGAACCCGACCCGATCTAACGGACCAGCCGCTCCCAGATGCCGATCATACCTGGTACACTGAT
  GGAAGCAGTTTGTTACAAGAGGGACAGCGTAAGGCGGGAGCTGCGGTTACCACCGAGACAGAGGTAATCTG
  GGCTAAAGCACTGCCAGCCGGTACATCCGCTCAGCGGGCTGAACTGATAGCACTCACCCAGGCACTAAAAAT
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  CACTCCTCATTGAAAATTCATCACCTTCTGGCGGATCAAAAAGAACCGCCGACGGTTCGGAATTCGAACCAAA
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  Blue font: linker; purple font: MMLVrt; green font: SV40 NLS; black font: spacer sequence; red font: stop codon.

- **Moloney Murine Leukemia Virus reverse transcriptase (MMLVrt) coding sequence (rice codon-optimized) from Addgene Plasmid #140445.**
- **(CA)n substrate sequence**

TCTCAAGTGCGAGCATGCATCGACACACACACAGGCTTAGAATCTGGGGCAGATAGACACGACCGCAGCTGG
CACGACAGGTTTCCCGACTGGAAAGCGGcCAGTGAGCGCAACGCAATCCACCAGCGcC

❖ **p35SI-nCas9-PmCDA1-UGI-t35S**

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Blue font: CaMV 35S promoter with UBQ10 intron; black font: nCas9 (D10A, underlined); purple font: PmCDA1; orange font: UGI; red font: CaMV 35S terminator.

❖ **p35SI-nCas9-RT-t35S**

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TTGACTAAGCCCTTTGAACTCTTTGTGGACGAGAAGCAAGGATACGCGAAAGGTGTTCTAACGCAAAAATTA
GGACCTTGGCGTAGACCAGTGGCATACCTGTCAAAAAAATTGGATCCAGTTGCAGCTGGGTGGCCTCCTTGC

CTAAGGATGGTAGCAGCCATTGCCGTACTGACAAAGGATGCCGGCAAGCTAACCATGGGACAGCCACTAGTC
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CTCATTATCAGGCCTTACTTTTGGATACGGACCGGGTTCAGTTCGGACCGGTGGTAGCCTTAAACCCGGCTAC
GCTGTTACCACTGCCTGAGGAAGGACTACAACACAATTGTCTTGATATTTTAGCCGAAGCACACGGAACCCGA
CCCGATCTAACGGACCAGCCGCTCCCAGATGCCGATCATACCTGGTACACTGATGGAAGCAGTTTGTTACAAG
AGGGACAGCGTAAGGCGGGAGCTGCGGTTACCACCGAGACAGAGGTAATCTGGGCTAAAGCACTGCCAGCC
GGTACATCCGCTCAGCGGGCTGAACTGATAGCACTCACCCAGGCACTAAAAATGGCAGAAGGTAAGAAGCTA
AACGTTTATACTGATAGCAGATATGCTTTTGCTACTGCTCATATCCATGGAGAAATATACAGAAGGCGTGGTT
GGCTCACATCAGAAGGCAAGGAAATCAAAAATAAAGACGAGATTTTGGCCCTACTAAAAGCCCTCTTTCTTCC
TAAAAGATTAAGCATAATTCATTGTCCAGGACATCAAAAAGGACACAGCGCCGAGGCTAGAGGTAACCGGAT
GGCTGATCAAGCTGCCCGAAAGGCAGCTATTACTGAGACTCCAGATACCTCTACACTCCTCATTGAAAATTCAT
CACCTTCTGGCGGATCAAAAAGAACCGCCGACGGTTCGGAATTCGAACCAAAGAAGAAGAGGAAAGTGTAA
GCTTCTCTAGCTAGAGTCGATCGACAAGCTCGAGTTTCTCCATAATAATGTGTGAGTAGTTCCCAGATAAGGG
AATTAGGGTTCCTATAGGGTTTCGCTCATGTGTTGAGCATATAAGAAACCCTTAGTATGTATTTGTATTTGTAA
AATACTTCTATCAATAAAATTTCTAATTCCTAAAACCAAAATCCAGTACTAAAATCCAGATC

Blue font: CaMV 35S promoter with UBQ10 intron; orange font: nCas9 (H840A, underlined); purple font: linker; dark blue font: MMLVrt; green font: SV40 NLSs; red font: CaMV 35S terminator.

- **pegRNA1_CA**

5’-
GCATGCATCGACACACACACGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGCTGTCGTGCCAGCTGCtgtcgTGTCTATCTGCCCCAGATTCTAAGCCTGTAT
GTGTGTCGATGCAT-3’
Red font sequence: gRNA; Purple sequence: 5’ pgeRNA linker; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution; black font: spCas9 scaffold.

- **sgRNA_nick for second nick on the (CA)n substrate**

GAAACCTGTCGTGCCAGCTGGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGC
Red font sequence: gRNA; black font: spCas9 scaffold

- **sgRNA_CA for base editing on the (CA)n substrate**

ACACACAGGCTTAGAATCTGGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGC
Red font sequence: gRNA; black font: spCas9 scaffold

- **pegR_HKT12**

5’-
ATCATCATGTTTTCATTTGTGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGCTTGCAgATTGTGGTTTcTTACCTACAAATGAAAACATG -3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT template; green nucleotide: base substitution.

- **sgR_HKT12_2n for second nick at the SlHKT1;2**

AAACAAATCCTTGACCAAAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG AAAAAGTGGCACCGAGTCGGTGC

Red font sequence: gRNA; black font: spCas9 scaffold

- **pegR_EPSPS1**

5'-
ACAGTAACTGCTGCTGTCAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG AAAAAGTGGCACCGAGTCGGTGCAGGAAtcGCAATGCGTtctTTGACAGCAGCAGTT-3'

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT template; green nucleotide: base substitution.

- **sgR_EPSPS1_2n for second nick at the SlEPSPS1**

AATAAATACGAATTTTGAGAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG AAAAAGTGGCACCGAGTCGGTGC

Red font sequence: gRNA; black font: spCas9 scaffold

- **pegR_Or**

GAGATAATATTAGAAGTAGGGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG AAAAAGTGGCACCGAGTCGGTGCATCTTGTTCCTatgACTTCTAATATT

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT template; green nucleotide: base substitution.

- **sgR_Or_2n for second nick at the SlOr**

AAAAACAAATGGCACGAAGAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTT GAAAAAGTGGCACCGAGTCGGTGC

Red font sequence: gRNA; black font: spCas9 scaffold

- **pegR1_ MBP21**

5'-
AGCTCCTTCAACGTTCTCAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA AAAAGTGGCACCGAGTCGGTGCTATCTTACCTTTaAGAACGTTGAAGG-3'

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution.

❖ **pegR1_WH9**

5’-
CTTGAAGCAATCTTTAATTCGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGCTCACCATGtCTGAATTAAAGATTGCTT-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution.

❖ **pegR1_KD1**

5’-
TTTGACAAAGACACATTTTGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGCACTGTAAAAAATGTTCTTTTCCAAAAATGTGTCTTTGTC-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution.

❖ **pegR1_PRD**

5’-
AGAAAAACCAGATGCTGGAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTT
GAAAAAGTGGCACCGAGTCGGTGCAAAACTAAAAGCTCATCCATTCCAGCATCTGGTTT-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution.

❖ **pegR1_ALC**

5’-
GTTCCACCGGAAGTAAAAACGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGCGACAAGCCGGaTTTTACTTCCGGTG-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT tem plate; green nucleotide: base substitution.

❖ **pegR1_DMR6**

5’-
TAGAGAAGTATGCTCCTGAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGCTAGAAGGCCATTaAGGAGCATACTTC-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT template; green nucleotide: base substitution.

❖ **pegR1_ALS1**

5’-
CTATTACAGGTCAAGTGCCAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGCTCATCCTCCTTGaCACTTGACCTGTA-3’

Red font sequence: gRNA; Blue sequence: PBS; orange sequence: RT template; green nucleotide: base substitution.

- **sgR1_ MBP21**

5’-
AGCTCCTTCAACGTTCTCAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

- **sgR1_WH9**

5’-
CTTGAAGCAATCTTTAATTCGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

- **sgR1_KD1**

5’-
TTTGACAAAGACACATTTTGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTGA
AAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

- **sgR1_PRD**

5’-
AGAAAAACCAGATGCTGGAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTT
GAAAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

- **sgR1_ALC**

5’-
GTTCCACCGGAAGTAAAAACGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

- **sgR1_DMR6**

5’-
TAGAGAAGTATGCTCCTGAAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

❖ **sgR1_ALS1**

5’-
CTATTACAGGTCAAGTGCCAGTTTTAGAGCTAGAAATAGCAAGTTAAAATAAGGCTAGTCCGTTATCAACTTG
AAAAAGTGGCACCGAGTCGGTGC-3’

Red font sequence: gRNA; black font: SpCas9 scaffold.

❖ **p35SI-Cas9-RT-t35S**

GAATTCCAATCCCACAAAAATCTGAGCTTAACAGCACAGTTGCTCCTCTCAGAGCAGAATCGGGTATTCAACA
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AATTAGGGTTCCTATAGGGTTTCGCTCATGTGTTGAGCATATAAGAAACCCTTAGTATGTATTTGTATTTGTAA
AATACTTCTATCAATAAAATTTCTAATTCCTAAAACCAAAATCCAGTACTAAAATCCAGATC

Blue font: CaMV 35S promoter with UBQ10 intron; orange font: full function Cas9 (H840, underlined); purple font: linker; dark blue font: MMLVrt; green font: SV40 NLSs; red font: CaMV 35S terminator.

❖ **p35SI-Cas9-t35S**

GAATTCCAATCCCACAAAAATCTGAGCTTAACAGCACAGTTGCTCCTCTCAGAGCAGAATCGGGTATTCAACA
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CCTAAAACCAAAATCCAGTACTAAAATCCAGATC

Blue font: CaMV 35S promoter with UBQ10 intron; orange font: full function Cas9 (H840, underlined; green font: SV40 NLSs; red font: CaMV 35S terminator.

❖ **p35SI-nCas9-PPE-t35S expression cassette**:

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AGCCCAAGAGCTTTGCTAAGGCCCTAACAAGCCCACCAAAGCAAAAAGCCCACTGGCTCACGCTAGGAACCA
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CAGTACTAAAATCCAGAT

Blue font: CaMV 35S promoter with UBQ10 intron; orange font: nCas9 (H840A, underlined); purple font: linker; dark blue font: MMLVrt; green font: SV40 NLSs; red font: CaMV 35S terminator.

- **Plant selection marker**: pNOS-NptII-tOCS cloned from pICSL11024 (pICH47732::NOSp-NPTII-OCST) (Addgene Plasmid #51144).