

Supplementary materials

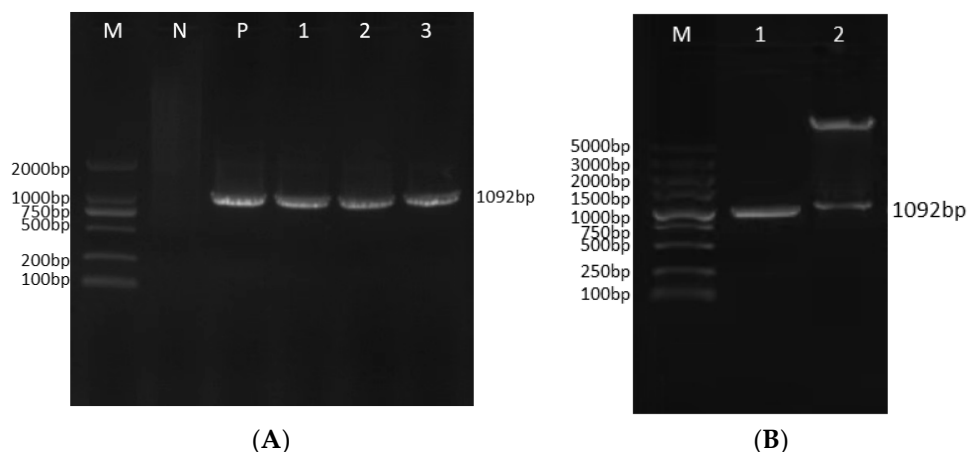


Figure S1. Construction of the pCambia3301-ZmSAG39 vector. (A) *ZmSAG39* gene test results. M: DNA Marker DL 2000; N: Blank control; P: Positive control; 1-3: PCR amplification results. (B) Double digestion verification results. M: DNA Marker DL 5000; 1: pCambia3301-ZmSAG39 recombinant plasmid without restriction digestion; 2: pCambia3301-ZmSAG39 recombinant plasmid with restriction digestion.

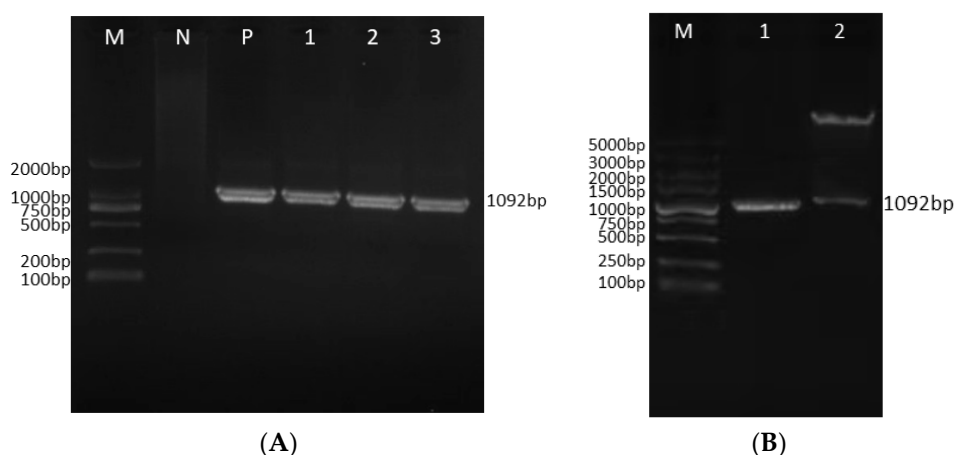


Figure S2. Construction of the pCambia1302-ZmSAG39 vector. (A) *ZmSAG39* gene test results. M: DNA Marker DL 2000; N: Negative control; P: Positive control; 1-3: PCR amplification results. (B) Double digestion verification results. M: DNA Marker DL 5000; 1: pCambia1302-ZmSAG39 recombinant plasmid without restriction digestion; 2: pCambia1302-ZmSAG39 recombinant plasmid with restriction digestion.

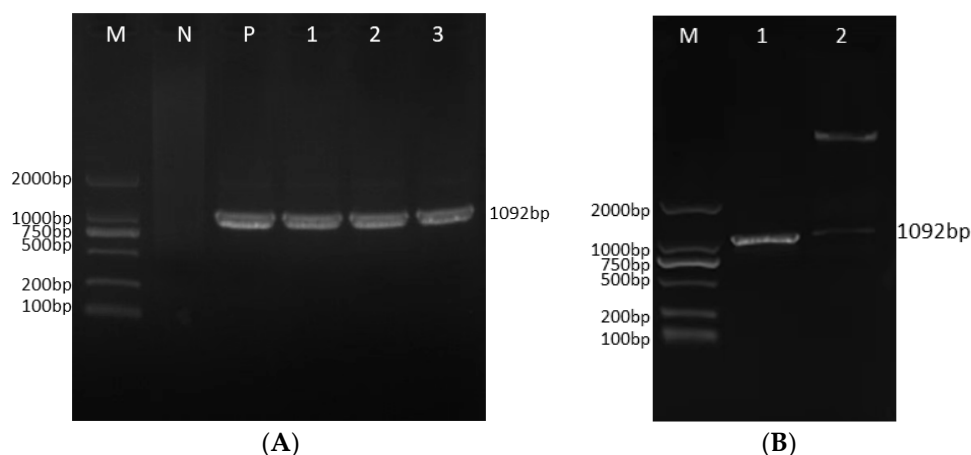


Figure S3. Construction of the pGBKT7-ZmSAG39 vector. (A) *ZmSAG39* gene test results. M: DNA Marker DL 2000; N: Negative control; P: Positive control; 1-3: PCR amplification results. (B) Double

digestion verification results. M: DNA Marker DL 5000; 1: pGBKT7-ZmSAG39 recombinant plasmid without restriction digestion; 2: pGBKT7-ZmSAG39 recombinant plasmid with restriction digestion.

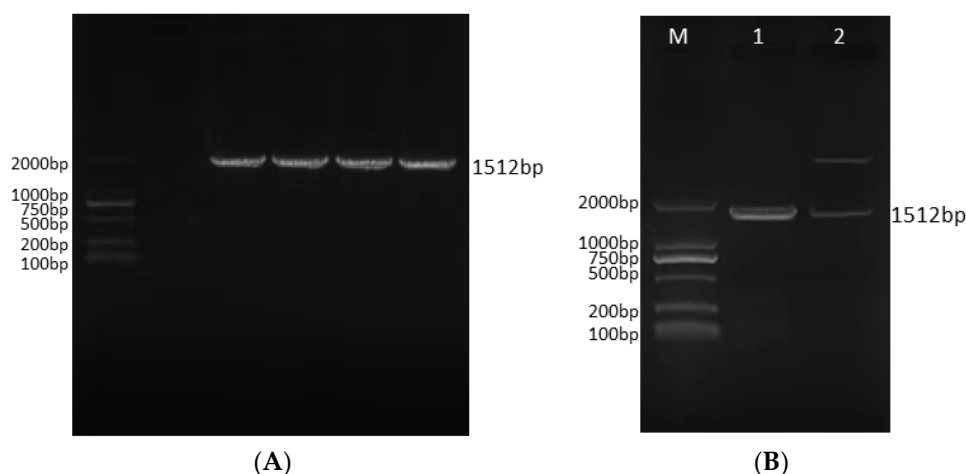


Figure S4. Construction of the pGADT7-ZmYKT62 vector. (A) *ZmSAG39* gene test results. M: DNA Marker DL 2000; N: Negative control; P: Positive control; 1-3: PCR amplification results. (B) Double digestion verification results. M: DNA Marker DL 2000; 1: pGADT7-ZmYKT62 recombinant plasmid without restriction digestion; 2: pGADT7-ZmYKT62 recombinant plasmid with restriction digestion.

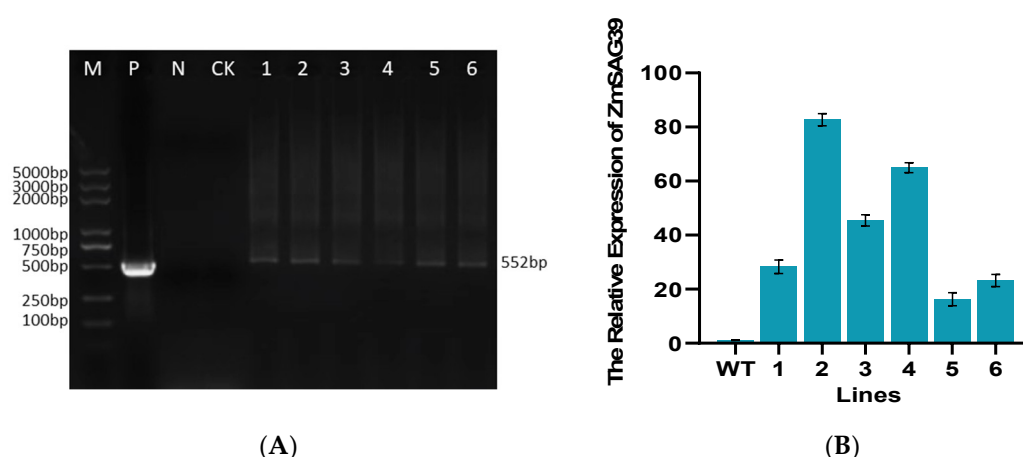


Figure S5. Detection of *ZmSAG39* transgenic plants. (A) The overexpression of *ZmSAG39* gene in T2 transgenic maize was detected by RT-PCR. M: DNA Marker DL 5000; N: Negative control; P: Positive control; CK: Wild type plant; 1-6: PCR amplification results. (B) Expression analysis of *ZmSAG39* in overexpression of *ZmSAG39* lines. 1-6: Transgenic plant lines (OE3/OE7/OE8/OE11/OE15/OE21).

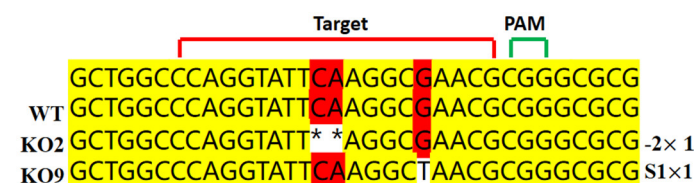


Figure S6. Sequences analysis revealed efficient targeted genome editing using the CRISPR-Cas9 system. The white letters in the sequence indicated mutations, where S indicated replacement and - indicated deletion. The letter on the right indicated the number of transgenic plants that were mutated in the same type of transgenic line.

Table S1. Primers for RT-PCR.

Primers Name	Primers Sequence(5'-3')
35S::ZmSAG39-F	acgacggccagtgccagcttATGGGTCTCTGTCGAGTTCAATGTT

35S::ZmSAG39-R	acgggggactcttgaccatggGGAGCACCCGTGGATTTCCTT
GFP-F	acgggggactcttgaccatggATGGGTCTCTGTTCGAGTTCAATGTT
GFP-R	tctccttactagtcagatctGGAGCACCCGTGGATTTCCTT
BK-F	atggccatggaggccgaattcATGGGTCTCTGTTCGAGTTCAATGTT
BK-R	ccgctgcaggtcgacggatccGGAGCACCCGTGGATTTCCTT
AD-F	atggccatggaggccgaattcAACGCACGAAACCTCATT
AD-R	ccgctgcaggtcgacggatccACTGATAACAGAGTTCATTGCC
ZmSAG39-UP	GGCGGCTAGAGGAATGGTAC
ZmSAG39-LOW	ACTCTTTGCTGGTCAGGTCTG

Table S2. Primers for qRT-PCR.

Primers Name	Primers Sequence(5'–3')
ZmMir3-F	GCAAGCTTCACGTTCTGCAA
ZmMir3-R	TGTATGTCCCGTTTCACGCA
ZmSee1-F	ACGCGCGAATTCATTTCAG
ZmSee1-R	TCGAGCACGTAGAGGAGGAA
ZmCAO1-F	TCGAGGAGCAGTGGGTGATA
ZmCAO1-R	CATGGCAATGACTGGATGCG
ZmSAG39-F	ACATGAACCATGCAGTGACG
ZmSAG39-R	AGCTGCATGAAACCGTTCTC
ZmLTP3-F	ATGGCTGCTCCGAAGCTC
ZmLTP3-R	TGCAGTTAACGTTGGTGC
ZmSOS1-F	TGTTGCGTCACTTTGGGTAT
ZmSOS1-R	TCCTCGT-CATCCCTTAGTTC
ZmNYC1-F	ACGGGGGAGAGTACCAGTAC
ZmNYC1-R	ATTTGGCTGTCTCCACCTGG
ZmPAO-F	CCGTGGCAGAACTCTGTTCT
ZmPAO-R	GATGAGGCGAGGAAGGGATG
ZmActin1-F	ATGTTTCCTCCCATTGCCGAT
ZmActin1-R	CCAGTTTCGTCACTCTCCCTTG
ZmRD20-F	CTCCTTTGCTGTCCATCCGT
ZmRD20-R	TGAGCTCAACTCGTCTTTTGTT
ZmSAG12-F	AGTTCGACGACAGCTTCTGG
ZmSAG12-R	GGAATTTGGAAGAGGCCGGA