Table S1. Applications of base editing in plants.

Method	Plant species	Target gene	Gene function	Base editor construct	Trait improvement	Mutant base sites	Reference
ABE	Rice	*sgOs-siteG1* *sgOs-site2* *sgOs-site3* *sgOs-site4*		ABE7.10-nSpCas9-NGv1	-	-	[19]
CBE	Rice	*OsSBEIIb* *OsPDS*	*OsPDS:* encodes a phytoene desaturase *OsSBEIIb:* encodes a starch branching enzyme IIb in rice	PCXUN-be3	-	*OsPDS*: G8→A8 G10→A10 G8→C8 *OsSBEIIb:* G5,6→A5,6 G6→A6 G5→A5 G5→C5 G6→C6 G6→T6 G5→T5 G5,6→T5,6	[60]
CBE	Rice	*NRT1.1B* *SLR1*	*SLR1* encodes a *DELLA* protein *NRT1.1B* encodes a nitrogen transporter	APOBEC1-XTEN-Cas9(D10A)-NLS	High nitrogen Use efficiency and Reduced plant height	*NRT1.1B:* C7→T7(T327M) *SLR1:* C6→T6 (S97L)	[61]

GhBE3	Tetraploid cotton	*GhCLA* *GhPEBP*	*GhCLA* functions in chloroplast development. *GhPEBP* participates in the multiplex-branch	GhBE3	-	-	[61]
CBE	Rice Wheat Maize	RICE: *OsCDC48* *OsNRT1.1B* *OsSPL14* Wheat: *TaLOX2-S1* *TaLOX2-S2* *TaLOX2-S3* Maize: *ZmCENH3*	*OsCDC48* regulates senescence and cell death. *NRT1.1B* encodes a nitrogen transporter. *OsSPL14* controls grain yield and grain number	pnCas9-PBE	Reduced senescence and death.	*OsCDC48:* C3→T3 C7→T7 C7→T7 C8→T8 C3,4→T3,4 C7,8→T7,8 C3,4,7→T3,4,7 *OsNRT1.1B:* C4→T4 C7→T7 *OsSPL14:* C3→T3 C6→T6 *TaLOX2*:C3,6,9→T3,6,9 C3→T3 *ZmCENH3*:C3→T3 C4→T4 C5→T5 C7→T7 C8→T8	[64]
ABE	Rice	*OsALS1* *OsTubA2* *OsGS1* *OsACC*	*OsALS* encodes acetolactate synthase, *OsTubA2*: a novel	TadA9	Herbicide resistance	*OsALS1:* A10→G10 (S627G) *OsTubA2:* T11→C11(M268T) *OsGS1:* A11→G11 (H249Y)	[65]

			artificial rice germplasm resistant to dinitroaniline herbicides was produced *GS1* gene is involved in regulating glutamine synthesis in old leaves *ACC:* Herbicide tolerance			*OsACC:* T12→C12 (C2186K)	
CBE	tomato	*SlDDB1* *SlDET1* *SlCYC-B*	*SlDDB1, SlDET1* and *SlCYC-B* : Responsible for the accumulation of carotenoids	PDicAID-nCas9-CDAUGI-LVA-NptII	Carotenoids accumulate more tomato strains	*SlDDB1:* G3→A3 A312T G9→C9 (D310H) G3→A3 and G9→C9(D310H) and (A312T) *SlDET1*:G2,3→T2,3 and C9→T9 (P479F and A481V) G2,3→T2,3 (P479F) *SlCYC-B:* G3,4→A3,4 STOP codon G6→A6 (M117I)	[66]

ABE	Strawberry	*FvebZIPs1.1*	the conserved uORF of the strawberry transcription factor gene *FvebZIPs1.1*	A3A-PBE	Utilize bases Edit fine-tune the sugar content of strawberries	-	[67]
CBE	Water melon	*ALS*	Acetyl lactate synthase (*ALS*) catalyzes the conversion of pyruvate to acetolactate during plant growth, leading to the biosynthesis of branched-chain amino acids.	CBE3	herbicide-resistant	C7C8→T7C8(P190S)	[68]
CBE	Water melon	*ALS*	Herbicide tolerance	pBSE901	Herbicide-resistant watermelon strains	C7C8→T7C8 (P190S) (Herbicide resistant) C7C8→T7T8 (P190L) （Unknown）	[68]

CBE	Oilseed rape	*BnALS1*	Herbicide tolerance	pnCas9-PBE	Benzisulfuron Resistant rapeseed	C6,7→T6,7 (P197S) (Herbicide resistant) C6,7,8→T6,7,8 (P197F) (Unknown)	[68]
CBE	Rice	*ALS*	Herbicide tolerance	H-BE3-*OsALS*-P171 pH-BE3-*OsALS*-G628	Herbicide resistance	H-BE3-*OsALS*-P171: C6,7→T6,7 (P171S) C6→T6 and C7→G7 (P171A) C6,7→T6,7 and C8→A8 (P171Y) C6,7,8→T6,7,8 (P171F) C6,7,8,9,10→T6,7,8,9,10 (P171F and R172C) pH-BE3-*OsALS*-G628: G5,6,7→A5,6,7: (G628E/G629S) Combinations of edits generated by simultaneous editing of *OsALS*-P171 and *OsALS*-G628: G5,6,7→A5,6,7 and C6,7,8→T6,7,8: (P171F/G628E/G629S)	[69]

ABE	Rice	*OsSPL14* *OsSPL17* *OsSPL16* *OsSPL18*	They control grain yield and grain number	VQR-Cas9 (D10A)/ VRER-Cas9 (D10A)	High yield	-	[76]
CBE	Rice	*OsALS* *OsEPSPS*	*ALS*: Herbicide tolerance *OsEPSPS;* encodes a key enzyme in the synthesis of aromatic amino acids	A3A/Y130F-CBE-V01 A3A/Y130F-nCas9-NG-CBE-V01	Herbicide resistance	*OsALS:* G5→A5 (D349N) G12→A12 (D550N) *OsEPSPS:* C7,8→T7,8 (P173L)	[80]

CBE	Rice	*OsSPL14* *OsSPL16*	They control grain yield and grain number	A3A/Y130F-CBE-V01	elevated expression of *OsSPL14* and *OsSPL16* was detected in these edited lines	These edits had destroyed the *OsMIR156* binding sites in the mRNAs of *OsSPL14* and *OsSPL16*, The M0-1979-6-1 has a homozygous deletion at the *OsSPL14*-sgRNA01 site and biallelic base editing at the *OsSPL16*-sgRNA01 site. These mutations also abolished the *OsMIR156* binding sites in the mRNAs of *OsSPL14* and *OsSPL16*	[80]
CBE	Rice	*OsGS3* *OsGW2* *OsGN1a*	control grain yield	A3A/Y130FCBE-V01	Increased particle length (due to *OsGS3* knockout) and particle width increase (due to knockout *OsGW2*)	*OsGS3:* W→STOP *OsGW2:* Q→STOP *OsGN1a:* Q→STOP	[80]

ABE	Rice	*SLR1*	*SLR1* could block its GA-dependent degradation, making the plant dwarf	pRABEsp-OsU6	plant dwarf	*SLR1:* T6→C6 (V92A)	[81]
ABE	Rice	*OsSPL14* *OsSPL17* *OsSPL16* *OsSPL18*	They control grain yield and grain number	pRABEsp-OsU6sa	High yield	-	[81]
ABE	Rice (Indica rice)	*Waxy*	*Waxy* genes (*Waxy*): control straight-chain precipitation in rice	pHPABE-7-esgRNA	amylose content decreased	transgenic Mutant 1 to 3 (MT1, MT2 and MT3) MT1 A1246G(N247D) MT2 A1634G(N306D) MT3 A496G(Q128R)	[91]

CBE	Rice	*Wx*	*Waxy (Wx):* control straight-chain precipitation in rice	PBETS1 PBE-TS2 PBE-TS3	Low amylose rice	PBE-TS1: *Wxm5:* C2,3,5→T2,3,5 (P124F and R125W) PBE-TS2: *Wxm6:* G6,7→A6,7(G159K) *Wxm7:* G6→C6(G159A) *Wxm8:* G1→A1 and G6→C6 (G159A and D161N) *Wxm9:* G4→T4 and G6→A6 (G159E and V160F) PBE-TS3: *Wxm10:* C5,6→T5,6(T178I) *Wxm11:* C5→G5 and C6→T6(T178S)	[92]

CBE	Wheat	*TaALS*	*TaALS* encodes acetolactate synthase, which functions in the biosynthesis of the branched amino acid.	A3A-PBE	Herbicide resistance	C7,8,9→T7,8,9 (P197F)	[104]
CBE	Brassica napus	*BnALS1* *IAA7* *RGA*	*BnALS1:* strong resistance of sulfonylurea herbicides, *IAA7,* and *RGA:* plant dwarfing to varying degrees	A3A-PBE	Herbicide resistance Dwarfed strains	*BnALS1:* C7,8→T7,8 (P179F R180C) *IAA7:* C3,4,6,7→T4,6,7 (P92F P92L) *RGA*:C3,4,7→T3,4,7 (P94L S95L)	[110]
CBE	Rice	*Pi-d2*	*Pi-d2:* Rice fungus resistance gene	hAID*Δ-XTEN-Cas9n-NLS (rBE5)	Blast resistance	G4→A4(M441I)	[114]

CBE	Rice	*OsSWEET14*	*OsSWEET14:* Susceptibility genes for white leaf blight	eAFID-3	the predictable multi-nucleotide-targeted deletions generated by AFID-3 outside the TATA box in the effector-binding element conferred enhanced resistance to bacterial blight without affecting plant growth	AFID-3-induced predictable deletions in *OsSWEET14*	[120]
ABE	Rice	*OsTubA2*	Rice α-tubulin gene *OsTubA2*	rBE14	A new artificial rice germplasm resistant to trifluraline and no loss of adaptation was obtained	T7→C7(M268T)	[127]

CBE	Maize	*ZmALS1* *ZmALS2*	Acetyl lactate synthase (*ALS*): catalyzes the biosynthesis of branched-chain amino acids during plant growth.	NLS-APOBEC1-XTEN - nCas9(D10A)-UGI-SV40NLS (CT-nCas9)	Herbicide resistance	C7→T7 (P165S) C7→G7 (P165A) C7C8→T7G8 (P165W)	[132]
CBE	Tomato	*ALS*	Acetyl lactate synthase (*ALS*): catalyzes the biosynthesis of branched-chain amino acids during plant growth.	pDeSpnCas9-NG-PmCDA1-UGI (Target-AID)	Herbicide-resistant	C14→T14 (P186S) C14→A14 (P186A) C14→G14 (P186T)	[133]

CBE	Apple pear	*ALS* and *PDS*	*ALS:* Herbicide tolerance *PDS:* Carotenoid biosynthesis	pDenCas9_ PmCDA1_UGI	Anti-clonalulfuron and albino lines are obtained in pears.	*ALS:* apple: C12,13→T12,13:(P185L) C11→T11(R186W) pear: C14→T14 andC13→G13(P192C) C13,14→T13,14 (P192F) *PDS:* apple C17→T17 Q153STOP pear C11→T11 Q353STOP	[134]
ABE	Arabidopsis	*FT* *PDS3*	*FT* is an integrator factor and a key gene for regulating flowering pathways in plants *PDS:* Octahyd rolycopene dehydrogenase gene, which has the effect of protecting chlorophyll from photobleaching	pcABE7.10	Transgenic Arabidopsis strains with late-flowering and albino phenotypes were obtained	*PDS:* A6→G6 Incorrect splicing of RNA transcripts *FT:* T7→C7 (Y85H)	[135]

ABE	Rice	*ACC*	*ACC:* Herbicide resistance	Ubi-1-ecTadA-ecTadA*-nCas9-3xNLS	Herbicide resistance	T7→C7 (C2186R)	[137]
STEME	Rice	*OsACC*	Herbicide tolerance	APOBEC3A–ecTadA–ecTadA* nCas9 (D10A)	Herbicide resistance	P1927F W2125C S1866F A1884P	[138]
CBE ABE	Rice	*OsACC*	herbicide resistance	eBE3 eCDA eABE	Herbicide tolerance	*OsACC-T1* T7→C7 (C2186R) T13→C13 (C2186R) A16→G16 (I1879V)	[139]
CBE	Rice	*EPSPS* *ALS* *DL*	*EPSPS, ALS:* Herbicide tolerance *DL:* drooping leaf genes	NGv1 (D10A)	Herbicide tolerance	-	[142]
CBE	Rice	*EPSPS* *ALS* *DL*	Herbicide tolerance	Target-AID-NGv1 (D10A)	Herbicide tolerance	-	[142]

CBE	Rice	*ALS*	Acetyl lactate synthase (*ALS*): catalyzes the biosynthesis of branched-chain amino acids during plant growth.	nCas9Os-PmCDA1At (Target-AID)	Herbicide-Resistant	C3→T3 (A96V)	[144]
CBE	Tomato	*DELLA*	*DELLA* gene family: Regulation of gibberellin signaling in plants	nCas9At-PmCDA1Hs nCas9At-PmCDA1At (Target-AID)	-	nCas9At→PmCDA1Hs: C1→T1(PtoL) C3→G3(LtoV)	[144]

CBE	Tomato	*ERT1*	*ERT1:* regulate plant hormone signaling	nCas9At-PmCDA1At-2A	-	C5→T5(AtoV) G5→C5andG3→A3 (VtoL) G3→A3andG5→A5 (VtoI) G3→C3andG5→A5 (VtoI)	[144]
pDUBE1	Rice	*OsALS* *OsACC*	Herbicide tolerance	pDUBE1	Herbicide tolerance	C8,9,10→T8,9,10 (P171F) A16→G16 (I1899V)	[148]
CBE	Rice	*OsCERK1* *OsSERK1* *OsSERK2* *ipa1*	Encodes receptor-like kinase.	rBE3 （APOBEC1-XTEN -Cas9n-UGI-NLS)	Detect the efficiency of rBE3	rBE3: *OsSERK1* G4→A4 (D428N) *OsSERK2* G6→A6 (D433N) rBE4: *ipa1* C4→T4 (S918F)	[176]

-, not reported.

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