

**Table S1.** Changes of REC content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	REC (%)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	34.02±2.00defg	66.01±2.44cdefgh	92.26±1.21a	90.30±1.15ab
WCFZ	30.03±3.48efgh	67.97±4.46cdefg	80.15±4.00bcdef	89.73±0.31ab
YL1H	27.62±3.32ghijk	60.92±3.62fghi	87.94±2.81abc	92.01±1.67ab
YL2H	17.73±3.19m	66.30±0.83cdefgh	87.01±1.70abc	93.19±3.94a
YQ1H	19.23±0.99jklm	66.83±3.74cdefgh	86.45±2.85abcd	93.05±3.33a
YQ2H	23.36±3.11hijklm	66.76±1.13cdefgh	77.03±3.34cdef	92.67±1.75a
HNJ	18.43±1.08lm	68.11±4.94cdefg	76.70±1.70cdef	91.23±4.44ab
CJ	20.65±2.62ijklm	54.69±2.30i	72.55±4.83f	87.80±4.47ab
XYTJ	18.13±0.86lm	71.37±1.96bcde	80.88±3.35bcdef	94.03±2.33a
MLJ	19.12±0.90klm	63.35±3.67cdefghi	85.34±0.70abcde	82.46±2.33b
TJ	8.48±2.05n	59.00±2.54ghi	79.60±3.93bcdef	90.10±2.22ab
WCZP	16.80±2.25mn	61.42±3.05fghi	75.64±4.69def	86.33±0.64ab
HHHJ	19.19±4.45klm	70.15±2.57bcdef	81.54±1.34abcdef	89.47±2.98ab
LFJ	20.60±2.27ijklm	67.11±3.25cdefgh	83.16±2.58abcdef	91.58±3.47ab
TZJ	38.77±4.17bcde	62.66±2.63defghi	73.44±4.88ef	87.99±0.45ab
JYQ	28.33±3.28fghi	80.08±4.91ab	85.13±3.53abcde	89.88±4.03ab
XJ	37.11±2.82cdef	70.75±3.88bcdef	84.84±4.92abcde	88.28±4.12ab
SJ	28.37±4.41fghi	69.23±1.59cdef	82.47±2.62abcdef	93.97±1.10a
HYXJ	41.58±0.95abcd	86.63±2.56a	90.60±4.38ab	91.44±1.35ab
DYSJ	46.05±0.97ab	67.39±4.70cdefgh	81.24±2.17abcdef	86.75±4.52ab
QJ	48.68±2.76a	73.55±2.59bc	82.95±4.78abcdef	87.27±4.36ab
EWJ	45.40±1.49abc	72.20±3.40bcd	83.49±4.12abcdef	88.37±2.82ab
SCHJ	15.31±3.20mn	57.57±2.48fhi	77.44±2.61cdef	89.80±3.25ab
Average value	27.09±0.23ghijkl	67.39±0.78cdefgh	82.08±0.17abcdef	89.90±0.64
F value	46.96**	13.43**	5.75**	2.36**

Note: Different lowercase letters in the same column represent significant difference ( $P < 0.05$ ), “\*\*\*” means the difference was extremely significant at 1% level ( $P < 0.01$ ), “\*” means the difference was significant at 5% level ( $P < 0.05$ ), the same below.

**Table S2.** Changes of SS content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	SS ( $\mu\text{g/mL}$ )			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	378.53 $\pm$ 5.56bc	167.77 $\pm$ 5.62j	394.23 $\pm$ 8.56bc	321.10 $\pm$ 9.30cd
WCFZ	194.10 $\pm$ 8.20h	208.27 $\pm$ 10.24hi	309.77 $\pm$ 10.09f	269.97 $\pm$ 2.35ef
YL1H	174.93 $\pm$ 9.97hi	244.57 $\pm$ 16.01gh	156.10 $\pm$ 7.97k	177.87 $\pm$ 4.69jkl
YL2H	283.97 $\pm$ 14.80f	447.43 $\pm$ 10.37a	372.77 $\pm$ 23.20cd	213.17 $\pm$ 6.92hij
YQ1H	189.97 $\pm$ 17.63h	231.63 $\pm$ 13.27gh	291.87 $\pm$ 1.79f	328.27 $\pm$ 13.73c
YQ2H	410.00 $\pm$ 9.05ab	337.43 $\pm$ 18.65cd	385.53 $\pm$ 0.92c	256.63 $\pm$ 13.64efg
HNJ	163.60 $\pm$ 19.35hi	257.57 $\pm$ 14.81fg	383.00 $\pm$ 7.57cd	240.27 $\pm$ 15.70fgh
CJ	300.00 $\pm$ 14.37ef	320.80 $\pm$ 14.38de	277.00 $\pm$ 11.92fg	290.40 $\pm$ 1.50de
XYTJ	410.53 $\pm$ 14.03ab	208.27 $\pm$ 14.86hi	422.40 $\pm$ 15.07ab	197.30 $\pm$ 10.47ijk
MLJ	195.63 $\pm$ 5.56h	444.80 $\pm$ 9.47a	384.00 $\pm$ 10.83c	224.93 $\pm$ 12.50ghi
TJ	344.93 $\pm$ 10.99cd	295.07 $\pm$ 11.76ef	204.77 $\pm$ 12.50ij	181.63 $\pm$ 4.74jkl
WCZP	240.43 $\pm$ 11.47g	325.37 $\pm$ 4.94de	448.47 $\pm$ 12.00a	138.97 $\pm$ 11.63m
HHHJ	188.57 $\pm$ 12.48h	424.47 $\pm$ 13.99a	177.87 $\pm$ 16.94ijk	147.20 $\pm$ 15.56lm
LFJ	269.00 $\pm$ 10.90fg	315.13 $\pm$ 4.94de	250.00 $\pm$ 17.66gh	420.37 $\pm$ 6.21a
TZJ	394.53 $\pm$ 14.11ab	411.10 $\pm$ 16.31ab	425.97 $\pm$ 7.91ab	190.93 $\pm$ 16.21ijk
JYQ	334.33 $\pm$ 14.81de	420.87 $\pm$ 8.49a	196.80 $\pm$ 4.06ij	163.13 $\pm$ 4.94klm
XJ	329.67 $\pm$ 4.12de	439.83 $\pm$ 4.94a	368.67 $\pm$ 13.65cd	382.83 $\pm$ 13.75b
SJ	351.93 $\pm$ 10.11cd	437.30 $\pm$ 9.63a	205.00 $\pm$ 5.37ij	356.57 $\pm$ 5.56bc
HYXJ	327.07 $\pm$ 3.27de	261.73 $\pm$ 20.84fg	169.17 $\pm$ 10.75jk	272.20 $\pm$ 3.87ef
DYSJ	267.90 $\pm$ 7.66fg	191.37 $\pm$ 13.88ij	214.17 $\pm$ 6.91hi	323.67 $\pm$ 15.55cd
QJ	419.37 $\pm$ 12.96a	371.57 $\pm$ 18.84bc	310.87 $\pm$ 10.85ef	332.43 $\pm$ 16.21c
EWJ	289.20 $\pm$ 6.80f	366.97 $\pm$ 12.54c	346.70 $\pm$ 8.46de	165.70 $\pm$ 15.46klm
SCHJ	146.03 $\pm$ 10.14i	208.83 $\pm$ 12.54hi	364.57 $\pm$ 20.03cd	253.17 $\pm$ 20.84fg
Average value	287.14 $\pm$ 0.50f	319.05 $\pm$ 3.04de	306.94 $\pm$ 2.59f	254.34 $\pm$ 3.05efg
F value	171.19**	154.75**	181.86**	136.41**

**Table S3.** Changes of SP content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	SP (ng/mL)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	178.87±2.87d	132.30±4.80i	185.97±6.52de	189.03±7.48ghij
WCFZ	165.90±1.73def	156.13±3.97hi	237.50±4.06a	187.10±4.84ghij
YL1H	162.57±2.27efg	197.07±1.19cdef	148.23±2.27hi	200.83±2.68defg
YL2H	149.43±3.96gh	167.03±1.96gh	211.83±3.42bc	221.67±3.16abc
YQ1H	132.00±2.60i	180.17±5.64efgh	184.47±7.35de	165.30±6.91k
YQ2H	133.27±4.82i	198.73±4.56cdef	207.70±1.41bc	193.43±4.45efgh
HNJ	208.70±2.88bc	175.50±5.11fgh	147.50±3.48hij	209.60±8.61bcde
CJ	162.73±3.44efg	213.80±3.82abcd	195.40±6.21cd	231.97±4.56a
XYTJ	159.33±2.25fg	233.33±3.73a	157.47±4.25fghi	165.50±6.91k
MLJ	164.80±4.28ef	133.07±6.75i	159.37±8.81fgh	123.50±4.37m
TJ	168.00±4.03def	220.93±4.55abc	154.30±3.14ghi	206.37±4.05cdef
WCZP	168.33±4.27def	156.30±3.59hi	220.90±3.92b	187.63±4.60ghij
HHHJ	150.70±2.10gh	226.97±4.74ab	131.67±7.20jk	176.77±3.88ijk
LFJ	178.50±4.87d	190.73±3.96defg	130.33±5.78k	218.73±2.87abc
TZJ	214.93±1.81ab	231.47±4.54ab	185.17±5.12de	209.80±3.42bcde
JYQ	171.93±3.44def	157.63±4.60hi	142.77±6.62ijk	191.57±5.25fghi
XJ	142.80±4.03hi	199.33±7.48cdef	164.93±3.75fg	179.60±4.73hijk
SJ	173.80±4.90de	215.33±2.01abcd	172.60±3.48ef	141.70±4.65l
HYXJ	224.50±4.88a	132.83±4.05i	170.50±5.98efg	147.40±4.83l
DYSJ	204.00±7.30bc	230.00±1.70ab	161.70±2.90fgh	174.90±6.81jk
QJ	199.50±3.14c	237.60±7.69a	209.23±9.15bc	224.00±4.84ab
EWJ	210.97±0.86bc	205.17±3.93bcde	146.40±2.40hijk	200.30±7.30defg
SCHJ	206.10±7.62bc	217.93±4.75abcd	161.83±2.87fgh	199.57±4.62defg
Average value	175.29±0.77de	191.71±0.98defg	173.38±0.54ef	188.97±1.91ghij
F value	113.16**	44.28**	89.77**	80.07**

**Table S4.** Changes of PRO content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	PRO (ng/mL)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	7.43±0.29cde	7.26±0.19b	3.52±0.27l	3.92±0.16k
WCFZ	5.48±0.09ij	3.78±0.26h	3.82±0.09jkl	6.39±0.20efg
YL1H	4.64±0.14l	7.90±0.06a	3.75±0.25kl	4.95±0.37ij
YL2H	3.69±0.18m	6.58±0.08c	5.32±0.12fg	6.90±0.19cde
YQ1H	6.89±0.16efg	5.21±0.17def	4.12±0.30jk	3.77±0.33k
YQ2H	7.34±0.20def	6.58±0.08c	6.40±0.16cd	6.39±0.18efg
HNJ	6.73±0.15fg	4.97±0.14efg	4.33±0.26ij	5.83±0.20gh
CJ	7.62±0.09abcd	3.67±0.29h	4.18±0.18ijk	4.33±0.16jk
XYTJ	6.35±0.18gh	4.90±0.22fg	4.71±0.10hi	7.28±0.21bc
MLJ	8.10±0.03ab	3.86±0.27h	4.23±0.10ijk	6.13±0.06fg
TJ	7.50±0.21bcd	5.34±0.31def	3.80±0.13jkl	6.56±0.19def
WCZP	3.65±0.08m	4.50±0.39g	5.93±0.19de	7.13±0.26bcd
HHHJ	5.34±0.33jk	5.40±0.17def	3.94±0.19jkl	6.04±0.17fg
LFJ	8.20±0.17a	4.78±0.16fg	5.12±0.12gh	6.09±0.16fg
TZJ	6.00±0.18hi	3.33±0.17h	4.25±0.12ijk	4.66±0.11ij
JYQ	5.35±0.25jk	7.14±0.35bc	7.76±0.14a	5.92±0.16fg
XJ	7.47±0.17cde	7.04±0.12bc	7.02±0.06b	8.33±0.17a
SJ	4.74±0.19kl	5.60±0.16de	7.69±0.18a	6.27±0.16efg
HYXJ	7.87±0.36abcd	6.89±0.13bc	6.13±0.14de	5.80±0.33gh
DYSJ	4.90±0.26jkl	5.33±0.18def	5.68±0.20ef	7.65±0.17b
QJ	6.41±0.26gh	6.79±0.12bc	5.32±0.24fg	7.71±0.11ab
EWJ	8.05±0.13abc	5.71±0.09d	7.04±0.22b	5.18±0.20hi
SCHJ	5.20±0.14jkl	5.35±0.16def	6.71±0.15bc	7.28±0.29bc
Average value	6.30±0.00gh	5.56±0.05de	5.25±0.04fgh	6.11±0.01fg
<i>F</i> value	151.53**	117.51**	166.82**	99.89**

**Table S5.** Changes of SOD content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	SOD(U/mL)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	120.52±3.29de	167.99±8.42ab	43.43±4.69k	71.39±4.69hij
WCFZ	90.06±6.98f	103.86±1.45fg	117.03±3.82f	104.27±6.03cd
YL1H	41.47±1.86j	152.00±3.71c	154.50±3.73bc	84.15±3.68fgh
YL2H	107.22±5.37e	43.96±7.89lmn	176.10±4.07a	42.77±4.54k
YQ1H	131.13±5.62d	39.34±4.67mn	149.14±1.75bcd	37.16±5.84k
YQ2H	185.88±4.27a	37.04±4.34mn	56.24±2.83ij	39.67±4.51k
HNJ	116.28±4.59e	49.94±4.34klm	84.34±2.65h	68.10±5.73ij
CJ	168.14±4.71b	131.59±4.70de	134.62±6.31e	126.51±6.04b
XYTJ	153.88±5.14c	137.95±1.46cd	175.33±2.50a	118.19±3.23bc
MLJ	65.77±3.76hi	173.00±7.37a	96.19±3.59gh	79.13±5.20ghi
TJ	150.98±6.10c	96.94±4.34gh	156.79±3.50b	60.49±2.91j
WCZP	72.08±1.21ghi	152.07±6.82c	182.99±3.50a	167.87±6.04a
HHHJ	184.55±3.22a	153.03±3.39bc	138.89±3.19de	100.20±6.09de
LFJ	156.05±5.55bc	96.94±6.97gh	139.47±5.27de	165.36±7.81a
TZJ	69.39±4.10ghi	86.33±4.49hi	112.00±4.51f	128.54±2.65b
JYQ	58.79±4.67i	63.00±2.65jk	142.56±4.75cde	131.24±3.72b
XJ	35.88±6.75j	78.24±2.34ij	98.66±2.20g	159.39±2.74a
SJ	106.94±3.18e	32.93±4.52n	84.15±4.86h	69.55±5.04ij
HYXJ	81.71±2.31fg	57.03±2.34kl	62.49±9.01i	66.08±2.09ij
DYSJ	86.72±4.91f	60.31±4.26k	116.26±3.35f	69.35±1.86ij
QJ	114.64±6.36e	63.58±6.44jk	134.05±1.21e	104.83±3.06cd
EWJ	78.05±3.28fgh	118.91±6.37ef	44.51±3.23jk	87.86±5.62efg
SCHJ	164.87±3.06bc	60.89±4.92k	113.97±1.15f	106.37±2.03cd
Average value	110.48±1.14e	93.78±0.70ghi	117.99±1.25f	95.15±0.29def
<i>F</i> value	284.94**	245.15**	307.05**	204.52**

**Table S6.** Changes of POD content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	POD (U/L)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	251.63±3.61ij	323.27±12.47fgh	270.43±10.49gh	296.07±9.32ghij
WCFZ	349.13±1.79cd	269.67±14.56jk	271.13±5.77gh	349.73±4.84de
YL1H	364.63±5.77bc	248.73±9.77klm	214.07±6.81k	248.13±14.83mn
YL2H	348.83±7.58cd	341.47±7.71efg	405.07±10.65a	399.70±7.18a
YQ1H	393.50±11.89a	355.57±3.90cde	250.93±14.13hij	346.00±8.74def
YQ2H	316.90±10.95efg	235.00±8.87lmn	304.20±3.64ef	320.17±10.29fg
HNJ	295.27±7.29h	315.79±3.62gh	225.57±10.30jk	279.73±14.41jkl
CJ	365.33±8.73bc	401.93±6.03a	350.80±9.14c	266.80±2.14klm
XYTJ	299.03±6.03gh	344.90±11.18def	376.90±2.42b	241.37±4.10mn
MLJ	293.53±6.45h	389.57±8.93ab	251.30±7.95hi	242.37±7.92mn
TJ	313.80±7.98efgh	231.27±11.27lmn	308.70±4.37ef	313.83±7.74gh
WCZP	308.53±8.33fgh	237.80±5.84lmn	396.97±11.34ab	290.77±9.14hijk
HHHJ	251.80±6.71ij	218.93±9.72n	288.93±3.05fg	265.07±2.57klm
LFJ	333.23±9.61de	383.10±9.15ab	340.57±9.27cd	360.60±3.11bcde
TZJ	234.30±7.89j	372.47±13.41bc	263.40±4.68gh	260.30±4.78lm
JYQ	401.27±1.15a	317.63±4.26fgh	401.73±8.66ab	370.40±11.33bcd
XJ	261.80±2.14i	279.90±2.14ij	305.23±3.66ef	355.83±4.22cde
SJ	269.03±3.61i	237.43±3.88lmn	229.80±8.35ijk	311.13±12.14gh
HYXJ	382.03±7.21ab	370.43±1.58bcd	271.27±5.61gh	283.67±12.86ijkl
DYSJ	388.20±8.84a	257.30±9.19jkl	319.83±10.04de	231.83±10.22n
QJ	248.37±3.16ij	222.67±7.42mn	309.97±10.22ef	342.60±3.84ef
EWJ	381.67±5.85ab	396.80±12.04ab	341.90±5.10cd	387.70±12.73ab
SCHJ	326.53±2.70ef	238.13±10.76lmn	336.20±10.95cd	381.93±6.21abc
Average value	320.80±1.40ef	303.90±1.64hi	305.87±2.88ef	310.68±1.98ghi
<i>F</i> value	168.92**	156.03**	138.82**	102.06**

**Table S7.** Changes of CAT content in green prickly ash germplasm from different origins under different low temperature stress.

Variety	CAT(U/mL)			
	0 °C	-10 °C	-20 °C	-30 °C
RCWC	45.32±1.39fgh	61.74±1.10def	70.94±1.82de	86.27±2.06a
WCFZ	72.98±2.70c	46.72±1.18jk	51.75±1.41gh	79.75±0.87bc
YL1H	73.78±2.88b	81.38±2.19a	64.81±0.42ef	43.17±0.68lm
YL2H	78.36±1.73bc	73.24±3.39b	63.08±1.64f	46.71±1.75kl
YQ1H	50.08±2.09fg	51.60±1.90hij	45.82±1.67hi	53.13±2.45ij
YQ2H	52.51±2.26ef	44.64±0.42k	63.08±3.02f	48.61±0.87jkl
HNJ	39.03±2.97h	67.98±2.57bcd	47.73±1.80gh	72.51±1.66de
CJ	47.66±2.50fg	50.25±4.10ijk	89.39±0.98a	51.86±1.85ijk
XYTJ	51.88±0.71f	68.44±2.86bcd	82.17±1.76bc	53.49±1.81ij
MLJ	62.56±3.56d	50.43±2.11ijk	83.08±3.32ab	62.55±3.29fg
TJ	64.81±2.16d	72.47±1.28b	79.98±0.69bc	52.35±0.57ijk
WCZP	79.57±1.96abc	60.63±3.81ef	50.87±3.80gh	68.04±3.52ef
HHHJ	77.94±1.44c	69.21±1.36bc	67.71±1.65ef	86.89±1.69a
LFJ	85.45±1.72ab	60.09±2.87efg	75.50±2.20cd	61.00±1.34gh
TZJ	59.39±2.31de	53.67±1.08ghi	82.83±2.28ab	61.45±0.27g
JYQ	59.30±2.26de	73.37±2.07b	53.22±2.88g	55.59±2.46hi
XJ	86.09±0.27a	71.92±2.26b	51.50±2.11gh	53.07±2.11ij
SJ	43.91±2.37gh	58.28±2.71efgh	78.67±2.34bc	76.43±1.63cd
HYXJ	49.79±1.66fg	45.54±0.71jk	79.84±2.11bc	57.22±0.57ghi
DYSJ	46.17±3.68fgh	51.14±1.64ijk	39.91±2.79i	72.37±0.56de
QJ	64.46±1.91d	55.66±2.20fghi	84.91±2.00ab	39.72±0.95m
EWJ	49.52±2.18fg	85.75±0.95a	84.37±2.47ab	83.19±1.22ab
SCHJ	61.49±3.56d	86.92±1.85a	52.94±1.90g	45.58±3.53l
Average value	60.96±0.44d	62.65±0.53cde	67.14±0.76ef	61.35±0.46gh
<i>F</i> value	111.19**	96.87**	145.04**	170.15**