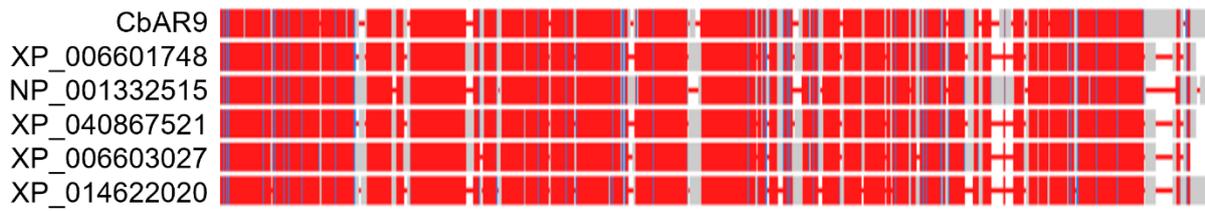
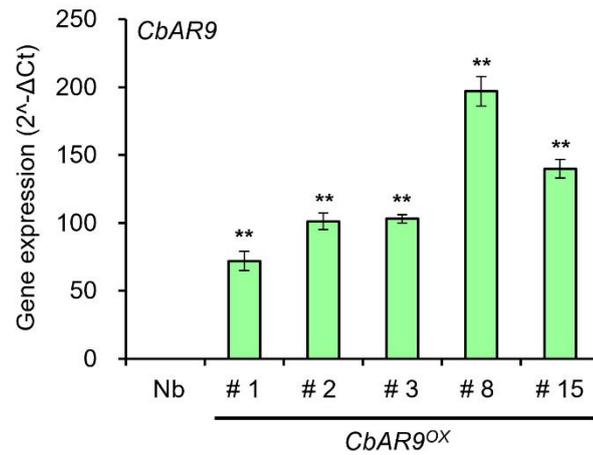


Supplementary Figure S1. A phylogenetic tree of the identified NLR proteins. A neighbor-joining tree was constructed with NGPhylogeny software using the full-length protein sequence of CbAR9 (CB.CBv1.2.scaffold1468.5) and CB.CBv1.2.scaffold1022.13/1022.20/2141.4/778.4/778.11/-778.13/778.14/778.16/778.21/778.26. The scale bar represents the proportion of site changes along each branch.

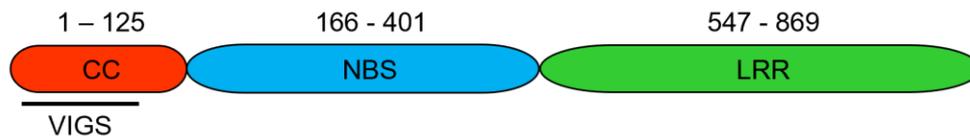


Accession	Organism	Description
XP_006601748	<i>Glycine max</i>	NBS-LRR disease-resistance protein scn3r1 isoform X2
NP_001332515	<i>Arabidopsis thaliana</i>	Disease resistance protein RPP8L3
XP_040867521	<i>Glycine max</i>	NBS-LRR disease-resistance protein scn3r1 isoform X1
XP_006603027	<i>Glycine max</i>	Disease resistance protein RPP13
XP_014622020	<i>Glycine max</i>	Disease resistance protein RPP13

Supplementary Figure S2. Identification of proteins with a similar NLR domain as CbAR9 in various plant species. The proteins were identified using the SmartBLAST program.

A**B**

Supplementary Figure S3. Verification and phenotype of *CbAR9*-overexpressing plant lines. (A) Analysis of *CbAR9* expression in *CbAR9*^{OX} and the wild-type *Nicotiana benthamiana* plants, as determined by RT-qPCR. *NbActin* served as the internal reference. Data are shown as means \pm SD. Asterisks indicate statistically significant differences from controls (** $P < 0.01$). The experiments were repeated at least three times, with similar results. (B) Growth phenotype of *CbAR9*^{OX} without biotic stress. Plants were grown in pots containing soil in a greenhouse under a programmed 16-h light/8-h dark photoperiod at 28 °C. The humidity was adjusted to 50%.



Atggcagatgtagcattacaactgctgtggagatattggttccgataataaaggagactggaagttgattgatagtggaagaagat
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Supplementary Figure S4. The target region of *CbAR9* for VIGS. The cDNA sequence of *CbAR9*. Yellow fluorescent sequence indicates the target region of VIGS. Red, CC domain; blue, NBS domain; green, LRR

CB.CBv1.2. Scaffold	Amino acid sequence
1468.5 (CbAR9)	<p>MADVALQLAVEILVPIIKETWKLIDSGKEDSANELLGELNRLKAFLQDAAKYR QSNSEQWKNFVKEVQVMVYEAEGGLIDKLMVEMKLVHQQKNKFEQIVDLKYHKT KDLVEDIKAILGKVKKIREANLQAFQAKPILDYQPEIVAPGTQDTLLEENKVV GFDEEAKVVIKRLVKGTDLVDPVVGLPGLGKTTLAIKISKDPQVSYDFFLT IWVSVGPQSKLKGVFLSILKAFKKQTTEYQDMDVKELPKIICEFIDKGGKCLI VLDDVWTTDVVDAVMNVFPEKSKGHRIMITTRDGRIGRYANANPHMLKFLEME ESFQLLVNRVFGSNIRRCPEELIEHGESI AKQCFGVPLAVVVIAGALRGRTSK SDWKMVEDNVKHLINKDDDPKSCLEFVEMSYVYLPEEMKACFLYCGAFPQGF IPAWKLIRLWISSEGLINSNLTGSPEDIAEYYLNDLINRNLVIVVQKRANGQVK TCRIHDMHLHQFCKIEANNEGLFHEVCEKTDQAGLSIPDLSSRHLCIPLSLLK AFISTEPYAEHVRSFLCFSTKQKESEKLSNIQQLHKAFFLVRVLDVESLEFSF SKYFRELYHLRYISISVSESVLPTFFGKFWNLQTLIIYTKASTIEIKAEIWNM LRLRHVHTNVPKLPSSSTHTVDESSRLQTLISKVAPESCREDALARACNLRLK TIQGMADFLINMGGFNNFQKLEQLKLLNDNVDRSMGVLHLLPPAFPKE LCKLKKLTLNTRFAWSEASRLGQLECLEVLKLENAFSGTTWVDEIGGFNQL KVLWIERADLKTWKVANLQFQRLQCLVVKSCDELEAVPIELADVRTLQEMTLE HTKKAIKSANAIKCRKQEMHREHMQKAAESKSGTEIEGKKKVSSEDMESFKFEL TIFPPETADCNPKH</p>
1022.13	<p>MLSFFANLCIALFVIPLTSCNPAVDMAHSSVASLMRTIESLLTSNSPMQTLIC GHRDEICPLHEKISSLEVFLKNFEKNNVGELTDLEVQIKEVANIVEQTIQLRV TEVLLANDENLREKSHERLSDSLQOVAEDIDRIWKESTNIQDKGKHASKESTV QEFLSSSRNINLVENSVMVGRDDQRKRLVEDLTRSYSGEPKVIIVGMGGIGKT TLANAVYNDACIRSHFDVCAWATISQQHNVKEILLSLLRSTKSDSFDMNDEAE LANMLQKSLKGRYLIVLDDMWKTESWDAVRLCFPSENKSGSILLTTRNSEVA RDAGTENLSLQMDLMPDESWNLFKSVAFANEALPSEFETIGKQIVEKCHGLP LTIHAVVARLLKSKRAIEEWENVAKDVKSFVTNDPDERCSRVLRLSYNHLTSDL KTCLLHFGIFPEDSEIPVKNLMRSWMAEGFLKLENDLEGEAVKCLQELVDRCL VLVCKKSLDGTKIRSCKVHDLIYDLCLREIERDNIFIMNDIVLEFDSGWTYLS LRKMKPFKRVTVDEIDYCRSGLYRALLTPVHRQLRDHDNDLFRNTRSFSSY PCTSHLFRKSELIHFKLLKVLELRNIKMDHFPVQILSLIWLRYLLLYFRKYLE IPPEICRLWNLQTFIVQGPSLWKITFPPEIILGLMQLRHLKLPFYLPNPPSVS ADKGSVSVFSNIQTISSMSPCCCTKEFIMRIQNVKELGLSAYQIDSSDGPLNS LVHLQOLETSLTYRFGGFWPASAKAFPATLKKLKLKDKTYLSWSYLDIIAELP NLEVLKLMYRACDGEWRPTVMGFNRLKLLIDNDLKYWKATDDDFPVLERL VLRRCHYLEKIPIEFAGIHSLOLIELNWGPPKLGDSAARIQQEQEEIGNNPV</p>
1022.20	<p>MGGIGKTTLANEVYNDACIRSHFDVCAWATVSQQHNVKEILLSLLRSTKGDTF DMNDEAEANMLQKSLKGRYLIVLDDMWKSEAWDAVRLCFPSENKSGSILLT TRNTDVALDAGTKNLSLQMDLMLDESWNLFKSVAFANEALPSEFETIGKQIA DECHGLPLTIHAVVAGLLKSKRAIENWKSVEEDVKSFVSNPDERCSRVVGLSY DHLTSDLKACLLHFAIFPEGSEIPVKNLRRSWMAEGFLKLENDLEGEAEKCLQ ELVDRCLVLVCKKSLDGTKIRSCKVHDLIYDLCLREIQRGVNFIMNDIVLYVA EPECLDLSMHKMQPFKRVPGDLIDNPYFGLYRALLTPVHRQLRDHDNDLKLKQ TCSI FSHLNDSCFILKSELIHFKLLKVLVLRHRDIDNFPQILSLIWLRYLS LVVHGHLLIPPEICRLWNLQTLVVKEYDPSFVTCVPQIWELVQLRHLKLPFRY LPDRPSVSVDKERDVGFNSLQTTSSLSSCCCTREVIMGIQNVKLEISGDEDD YESFWESGLVNNLVHLHQLETLSLTGTIILWPRTLPASTPSAKSFATLKKLN LTSTYLSWSYLDIIAELPNLEVLKLMGFACCGEGEEWHPVIMGFNRLKILLIE RSFLKYWKATDDNFPVLERLVLINCKCLKEIPIEFAEIHSLQLIEVALPYKSN IPWAIWNPPLTQRGSPQPECAARVGVSDSDTPHGSRPA</p>

CB.CBv1.2. Scaffold	Amino acid sequence
2141.4	<p>MQNVENSMVGRDDHRKWLVEDLTRSYSGEPKVIPIVGMGGIGKTTLANKVYNN ACIRSHFDVCAWATVSQQHNVKEILFSLLRSTKGGTFDMNDEAE LANMLQRSL KGKSYLIVLDDMWKSEAWDAVRLCFPSENKGGSGILLTTRNTEVARDAGTENLS LQMDLMGSNECWNLFKSVAFANEALPSEFATIGKQIAEKCHGLPLTIAVVAGL LKFKRAIEDWKSVAKDVKIFREDSEIPAKKLMRSWMAEGFLKLENDLEGEAEK CLOELVDRCLVLICKKSLDGTKIRSCYGICRHS LFKVRGHTLFSVLVTFPGEI WGLMQLRHLKLPFRNLPDCPSGSVDKGRHLD FSNLQ TISYLSLDCCTKEVIMG IQNVKELGICGYETDSNRILNNLVHLQQLETLSFIFCFAQFP GTLKKLLEST FLSWSYLDIITELPNLEVLKLMGFACDGE EWHPNVRGFTRLKLLLI EDYFLEY WRQFSCP</p>
778.4	<p>MAHASVASLTGTIESLLTSNSPMQSLSCDHREEICDLHKKISSLEIFLKNFDK NNVYQGITDLEVELKEVANIAEQTIQLRVTEVVLVND EK THERLSDTLQLVAE DIDRIWKVSTKIKDKGKQVSEGLVQDFSSINN I LNVNHTVGRDDQKERLL EHLTKSYSGESKVIPIVGMGGIGKTTLAKEVYSYESILRRFDVSAWATVSQQQ NIKEILL SLLQSTIKMDDTVKMKGEAEVKS LKRKRSRILLTTRNDEVGCYAGI ENISLRMSFMDQDESWNLFKSAAFSSEALPYEFETV GKQIADECHGLPLTIVV VAGLLKSKRAIKDWESVAKDVKSFFTNDPDERCSRVLG LSYNHLTSDLKTCLL HFGIFREDSEIPAKKLMRSWMAEGFLKLENDLEGEAEK CLOELVDRCLVLVCK RSLDGTKIRSYKVHDLIYDLCLKEIQRENIFIMKDI VVWVCISECQFLRMHKM QPFKCVTDDEIDYSRYGLYRALLTPVHRQLRDHDNNDLLKRTHSIFPFGLNDL FFMFKSELIHFKLLKVLNLSHVRIDSFPLQILNLIWLRYLALLIYVNLKI PRE ICRLWNLQTFIVKGMRLSVITFP EEIWGLMQLRHLKLSRFYLPDCPSGSVNKG RHLDFSNIQTISYLSQRCTKEVIMGIQNVKELGISGGDEIDSNGPLNNLVHL QQLETLSFIFCLKILPASAKAFPATLKNLKLERTLTSWSYLDIAEFPNLEVL KLMDHACLGD EWHPIVRGFTRLKLLI EEDNFLKHWKATDDNFVLERLVLKK CHNYKEIPIKSSYPCTSAYSFQITQKVLDSLHVRIDSFPLQLNLIWLRYLA LLIYVNLKI PREICRLWNLQTFIVKGMRLSVITFP EEIWGLMQLRHLKLSRFY LPDCPSGSVNKGRHLD FSNLQ TISYLSQRCTKEVIMGIQKVKELGISGGDEI DSNGPLNNLVHLHVQEE SKKI QDHNGRQESTWSLAQDKSSEKLLNLEVSNNMV GRGKEKRVLEELRGGSSDELKIPIVGMGF IGKTTLAKQVFNVKEILL SLLQ SIIQIDDKVYSRDEAE LADLLQKSLKRKRYLIVMDDI WSDKAWDDMRQCFPID NNRS</p>
778.11	<p>MAHASVASLMRTIESLLTINSPMRSLSFHDHREELSALREKTSSLEV VVKNFEK NNVCGEITDFEVEVKEVANFVEHTIQLVTEVLLANDENLREKAHWLSDSLQ QVEEDIDI IWEESIMIQDEGKQASKEPTVQEF PSSSKDMQTVESSMVGRDDHR KRKRLVEDLTRSYSGEPKVIPIVGMGGIGKTTLANEVYNNACIRSHFDVCAWA TVSQQHNVKEILFSLLRSTKGGTFDMNDEAE LANMLQRSLKGKRYLIVLDDMW KNEAWDAVRLCFPSENKGGSGILLTTRNTEVARDAGTENLSLQMDLMGPNECWN LFKSVAFANEALPSEFETIGKQIAEKCHGLPLTIAVVAGILKSKRAIEDWKSVA KDVKSLVTNDPDERCSRVLG LSYNHLTSDLKACLLHFGIFREDSEIPAKKLM RSWMAEGFLKLENDLEGEAEK CLOELVDRCLVLICKKSRDGTKIRSCKVHDLI YDLCLREIQRGNVFIMNDIVLDSMPVTGLFRVLLTPVHRQLRDHDNNDHLKRT RSIFSCHLKYSYSILKSELIHFKLLSVLELRHRLIDNFPPVILSLIWLRYLSL LCRENLDIPPEICRLWNLQTFIVQGMRTYIFPSDLVTFPEE IWGLMQLRHLKLP FRNLPDCPSGSVDKGRHLD FSNLQ TISYLSLDCCTKEVIMGIQNVKELGICG YETDSNRILNNLVHLQQLETLSFIFCFAQFPACAKAFPAMLKKLLESTFLSW SYLDIIAELPNLEVLKLMGFACDGE EWHPNVRGFTRLKLLLI EDYFLKYWNAT DDNFVLERLVLNKC HNLKEIPIEF AEIHTLQLIELERCLPELGESAARIQKE QEDLGNPDV D V R I SRPCDDGGGGGGG DDEEYF DAVDVAEDDDDDENSVDVVA EDDDDESDVDVAKDDDDDED F D A D A A E H D D</p>

CB.CBv1.2.
Scaffold

Amino acid sequence

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MVSGHNHQERNENTVDMAHASVASLMRTIESLLTINSPMRSLSFDHREELCAL
REKVSSLEVFKNFVKNNVSGEMTDFEVEVKEVASASEHTFQLRVTEVLLEND
EKIHERLSDTLQVAEDIDRIWKVSTKIQDKGKQASKESTVQDFSSSKNNILN
VNNIMVGRDDQKERLLEDLTASYSGEPKVIPIVGMGGIGKTTLAKEVYNNESV
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MQMDFMDQDESWNLFESAAFSSEALTXTNTPPSVNRIP

778.14 MVVWCIKAPAKDRTRPYHMQLYLEFCCKLLFYFPIPEIPFELYLIITEQIWKP
GEKILQISVKTIEFGLREAMIAEDEPQRGKAHEQLSDSVQQDIITKANVNI
MAHANVASLLRTIESLLSSNSPMRSVSCDHREDFALHEKISSLEVFLKNFEK
NNVSRELTDELVQIKEVANIVEQTIQLRVTEVVLKRHIMVGRDDQKERLLEDL
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EILLGLLRSTIKMEDRVKTRGEAELADMLQKSLKRKRYLIVLDDIWSCEVWDG
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FSNEASSEFETIGKKIAEKCHGLPLTIVVVAGLLKSKREIEYKSVAKDVTS
FVTNDPDKQCSRVLGSLYDHLTSDLKTCLLHFGIFPEDSEIPVKKLMRSWMAE
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FPEEIWGLMQLRHLKVKRYLNPSPSVSADKGSHTFRFSNIQTTSYLSSCCCTK
EVISGIRNVKKGFSGNNLSDSGLHNSLVYLQQLEILSFIRCSCILLPVTSK
VFPATLKKLKESTYLDWSYMDIAELPNLEVLKLIIDACDGEWQONVKGFT
RLKLLFIHDNRLKCWKATNDNFPVLERLMLSKCSTLKEMPIEFAEIHSLQIE
LTSCLPGLGKYAARIQKEQQDLGNNPVDVRI SNPFTEEV MANKDTELVTNQI
GSSGNENVDNEEIRKLRRQI IEMHRAWANGLPPPPVPTDNDLYLSSLPVSH
AQLPIFVDMPQHASRSTPGQQYPTTSNIHFLTPQYKITTCSALPAIHAFAPL
PSEAPAFNVNPTVVI PHSTSNPILNIFSDQHYPKPTFKSTGPYVFPQPPEFP
PNTEKPMTEEQEEIARKLRSLELTMKNLQGLGGYKSVSYKDLCMFPGVHLPL
GFKMPKFEKYDGHGDP I AHLRRYCNQLRGAGGKEELLMAYFGESLSGLASEWF
VDQDIDKWSWDDL ANEFVQQFQYNMELI PDEKSLTNMKNKSTETFREYAIRW
REQAARVKPPMKESKIVEAFIQVQDETY YQHLLPALGKPFVEVPKMGEMIEDG
IKTGRIVSFATLKATTQEIHKGLGSMGGRKNMEDASAI AVGQQAWARGPHHRY
PRAQTHVYAQAPT NHYQNPLYPVPPPPYQVYNAQPYVQPPSYPHWRAPTLSSH
PPTPHTY

778.16 MQSLICDQRVELCALHEKVSLEVFLKNFEKNNVSGEMTDFEVEVKEVASAAE
HAIQLSVTEVVLGENKSQKKKAHRRCHQSLQQVAKMDRIWTGSTKIQDKGKQ
VSKESLVHDFSSSTNDILKVKNMVGRDDQMKRLLKDLTRSCSDEPKVIPIV
GGIGKTTLAKEVYNNHKPILCHFVHAWATVSQQHNKKEIFLGLLRSTIKMDD
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LLTTRNNEIACYVDTDNLSLWMMFMDQDESWSLFSAAFSSEALPYEFQTVGK
QSOMNVTEKDLEGEAEKCLQDLVDRCLVLRMRSRDETKIRSCVHDLIYDLC
LREIQRGNVFTMNDVVFKEPDDCEPAHVSSGCHSLRMALLTPVHRQLRDQDN
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NL

CB.CBv1.2. Scaffold	Amino acid sequence
778.21	MAHACVASLMRTIESLLTSNSPMQSLIYDHREELCALCEKVSSLEVANNFEK NNVLGEMAELEVEVKEVASAVEHTIQLRVTEVLENDKSIKIQDKGKQASKES TVQEFPPSSPKDILNVENCMVGRDDQRKRLVEDLTRSKSVEPKVIPIIIGMGIA NMLKKSIMGKRYLIVLDDMWKTEAWDAVKLCFPPSGNKGSVILLTRITEVARD AGTKNLSLKTIEELPSDLKTIGKQIAEKCHGLPLTIAVVAGLLKSKRAIADWE NVAKDVKPFVTNDPDKQCSRVLGLSYNHLTSGLKTCLLHFGFFPEDSEIPTKK LMRSWMAEGFLKLENDLE
778.26	MADLEVQIKEVANVVEQTIQLRVTEVLENDVKAQERLSDSLQQVAEDIDCIW TESTKIQDKGKHASKESTVQEFPPSSRSILNVENSMVGRDDQRKQLVEDLTRS YSGEATVIPIVGMGGNLVEPSVIFYKGDVFTSEAEALAYILQKSLKVALYAGT KNSLPMRFMDQDESWNLFKSVAFSSEELPSDLETIGKQIADECHRLWNLQTFI VHGPMLSVITFPPEEIWGLMQLRHLKLPRIYLPDCPSGSVDKGRHMDFSNLQTI SYLSSRCCTKEVIMGIQNVKKLRIRRDASSGPLNNLVHLHQLETNLFTDSLS GLLPASAKAFPATLKKLKLKETGLSWPYLDIAELPDLEVLKLMDNAACLGNEW YPNVRGFTRWKVLLIKRNDLKYWKATDDNFPVLERLMIRSCYYLKEIPIEF IHTLQLIELIMCLPELGGFAARIQKEQEELGNNPVDVRIQWSHSSSFTCYC GFQGDVISLNWKNVAGFVF

Supplementary Table S1. Amino acid sequence of the identified candidate NLR proteins.

Gene	Primer sequence	Purpose
<i>CbAR9</i>	F: AAAAAGCAGGCTAAATGGCAGATGTAGCATTACAACCTTGC	Cloning
	R: AGAAAGCTGGGTATCAATGTTTGGGGTTGCAATCAG	Cloning
	R: AGAAAGCTGGGTAATGTTTGGGGTTGCAATCAGC	Cloning
	F: TCTAGAATGGCAGATGTAGCATTACAAC	VIGS
	R: GGTACCTTTGTGATATTTAAGATCCACGAT	VIGS
	F: CCATCCTCTACTACCCACAC	qRT-PCR
<i>778.14</i>	R: TGAAAGTTGTTGAACCCACC	qRT-PCR
	F: CCTGCATTAGGCAAGCCATTTG	qRT-PCR
<i>778.16</i>	R: CTGTTGTCCAACCTGCAATGGC	qRT-PCR
	F: GGCTGAGGTACCTATCATTGC	qRT-PCR
<i>1022.13</i>	R: TTGAAGAACCCACGCGACTC	qRT-PCR
	F: ACTCTTCTGATGGGCCTCTC	qRT-PCR
<i>PR1</i>	R: CCGCTATGATGTCCAAGTACG	qRT-PCR
	F: GAGGACAACGTCCGTATGGT	qRT-PCR
<i>PR2</i>	R: AACTCCAGTTACTGCACCATTA	qRT-PCR
	F: CTACTTAAGCTTTGCAAGCACCA	qRT-PCR
<i>ACT</i>	R: AGATCTCTTTCCCTCATCGTCACTT	qRT-PCR
	F: GTGCTGAGAGATTCCGTTGC	qRT-PCR
<i>NbPR1</i>	R: ATGGTTGAGCCACCACTGAG	qRT-PCR
	F: GTGCCAAAATTCTCAACAAGACT	qRT-PCR
<i>NbPR2</i>	R: AAATCGCCACTTCCCTCAGC	qRT-PCR
	F: CAACATAACCTTCCACTCTTAGCCA	qRT-PCR
<i>NbPR10</i>	R: CATAGAATCCAAAAGGGCATCAAAAAGA	qRT-PCR
	F: TGAGATTGTTGAGGGTGATGGGG	qRT-PCR
<i>NbACT</i>	R: TTGTCGCCTAAAACATCTCCTTCGA	qRT-PCR
	F: CCCAGATGGGCAGGTGATCA	qRT-PCR
	R: GAGTTGTATGTGGTCTCGTGGATTC	qRT-PCR

Supplementary Table S2. Sequence of primers used in this study.