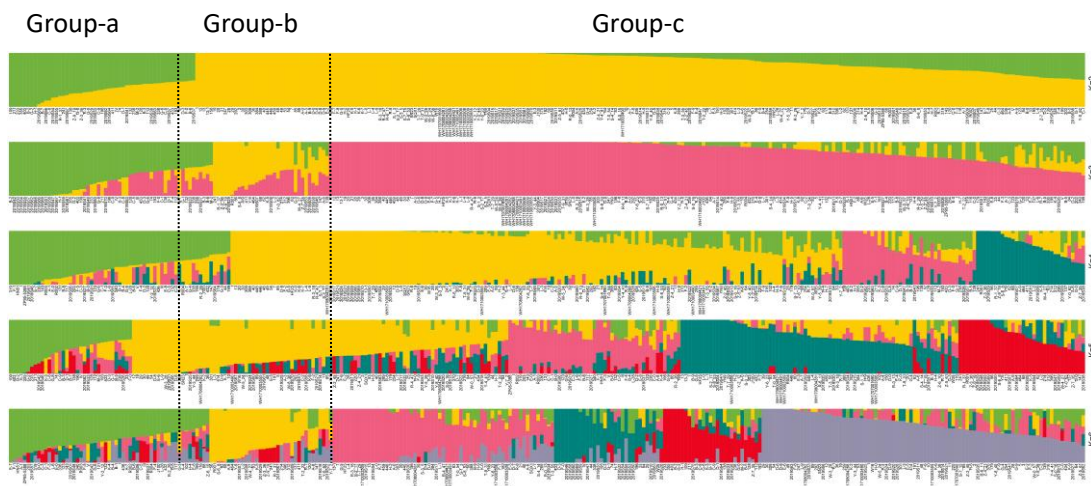
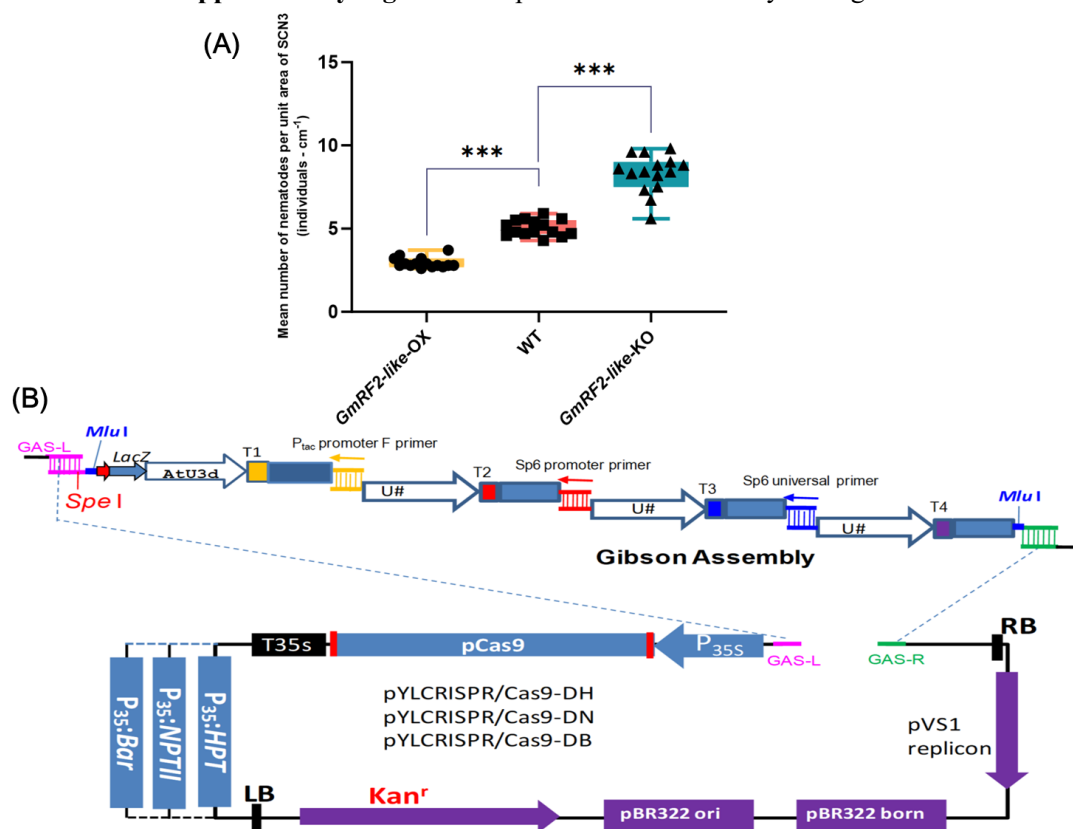


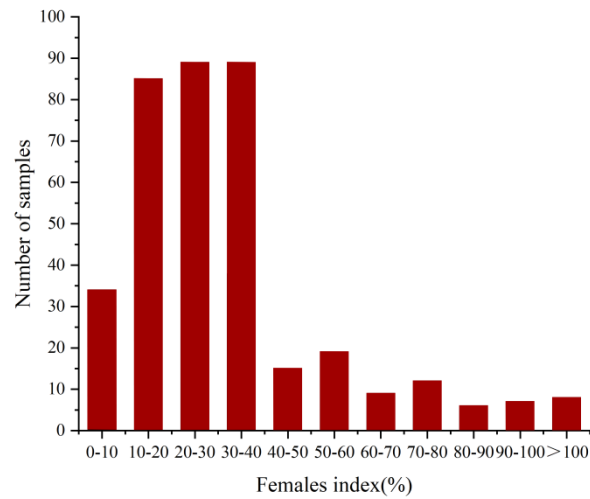


Supplementary Figure S1. Population structure analysis diagram.

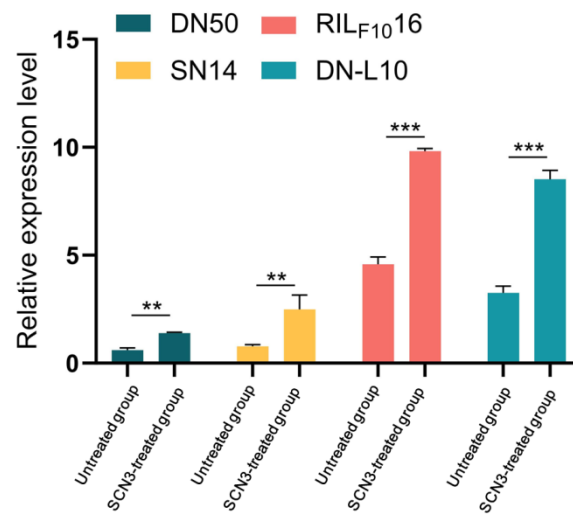


Supplementary Figure S2. Results of SCN Disease Phenotypic Identification.

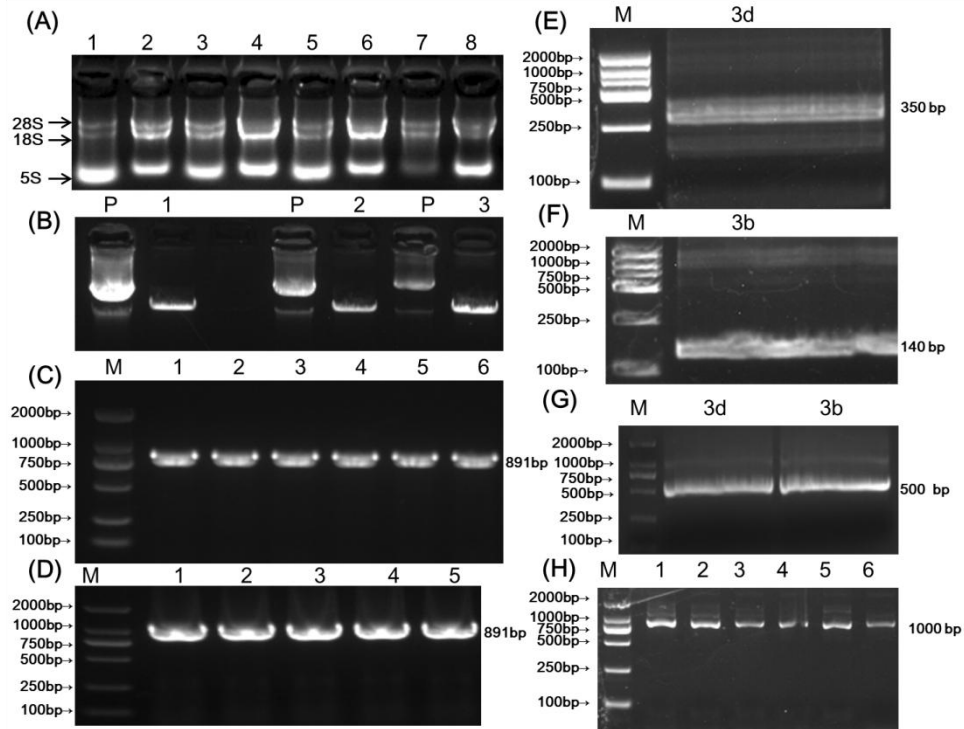
A: *GmRF2-like-KO1-3*: *GmRF2-like*-edited roots via CRISPR-Cas9 (for SCN phenotypic identification); **B:** Box plot of the number of identified SCN in *GmRF2-like-OX*, *GmRF2-like-KO*, and WT roots per unit area; **E:** Information on CRISPR-Cas9 gene editing backbone and target sequences.



Supplementary Figure S3. Distribution of female index of 306 soybean materials.



Supplementary Figure S4. Analysis of relative expression levels of soybean roots under SCN 3 stress.



Supplementary Figure S5 2 % Agarose gel electrophoresis.

A: RNA gel electrophoresis results of roots at the R₂ stage. Among them, lanes 1 to 2 represent DN-L10; lanes 3 to 4 represent RIL_{F10}16; lanes 5 to 6 represent SN14; lanes 7 to 8 represent DN50; **B:** Electrophoresis results of linearized plasmids. Among them:For pYLCRISPR/Cas9: P stands for pYLCRISPR/Cas9 plasmid DNA; lane 1 stands for linearized pCas9 DNA; For pCAMBIA3300: P stands for pCAMBIA3300 plasmid DNA; lane 2 stands for linearized pCAMBIA3300 DNA;For pCAMBIA1302: P stands for pCAMBIA1302 plasmid DNA; lane 3 stands for linearized pCAMBIA1302 DNA; **C:** Results of PCR-specific amplification of the *GmRF2-like* gene; **D:**lanes 1 to 5 represent cloned target DNA fragments; **E:** Results of first-round PCR-specific amplification of 3d;**F:** Results of first-round PCR-specific amplification of 3b;**G:** Results of second-round PCR-specific amplification of 3d and 3b;**H:** Results of bacterial liquid PCR after pCas9 transformation;