# Genetic basis of leaf variance in *Brasicca rapa*

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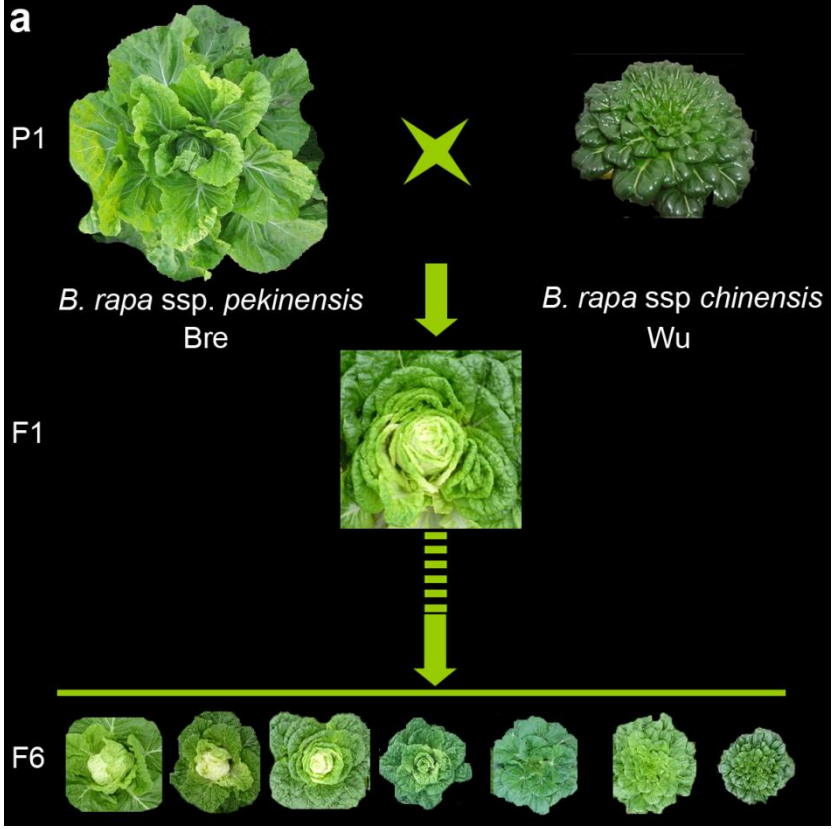
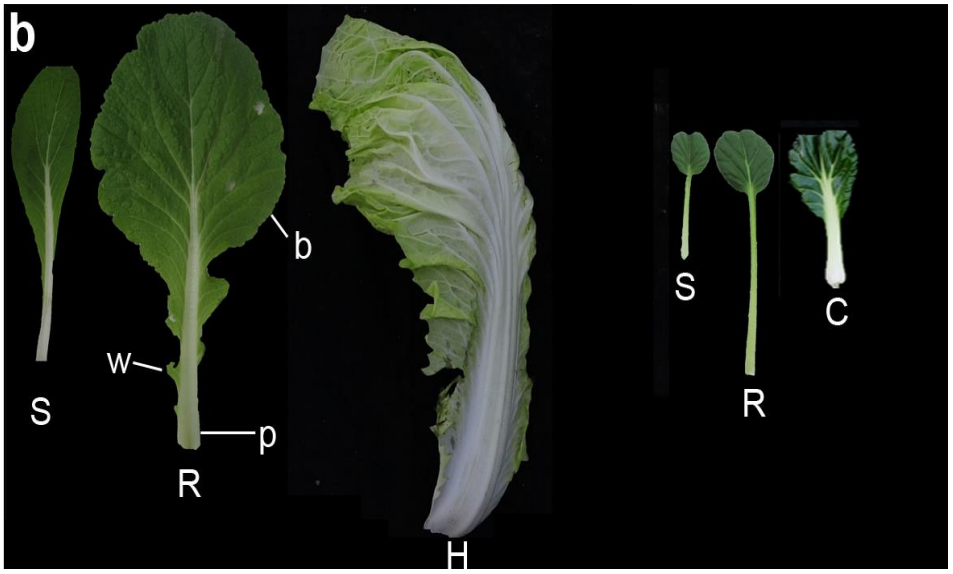
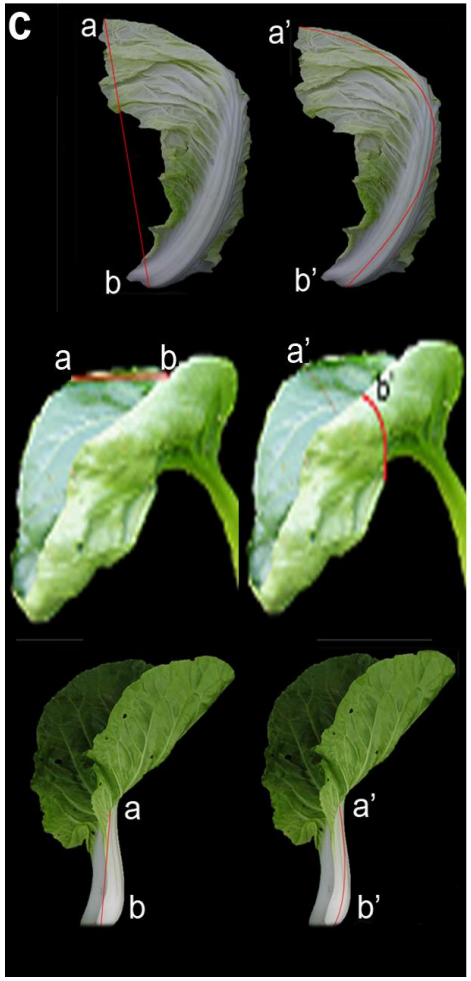
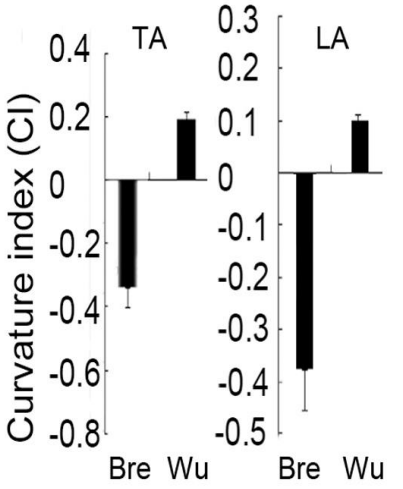
SIPPE

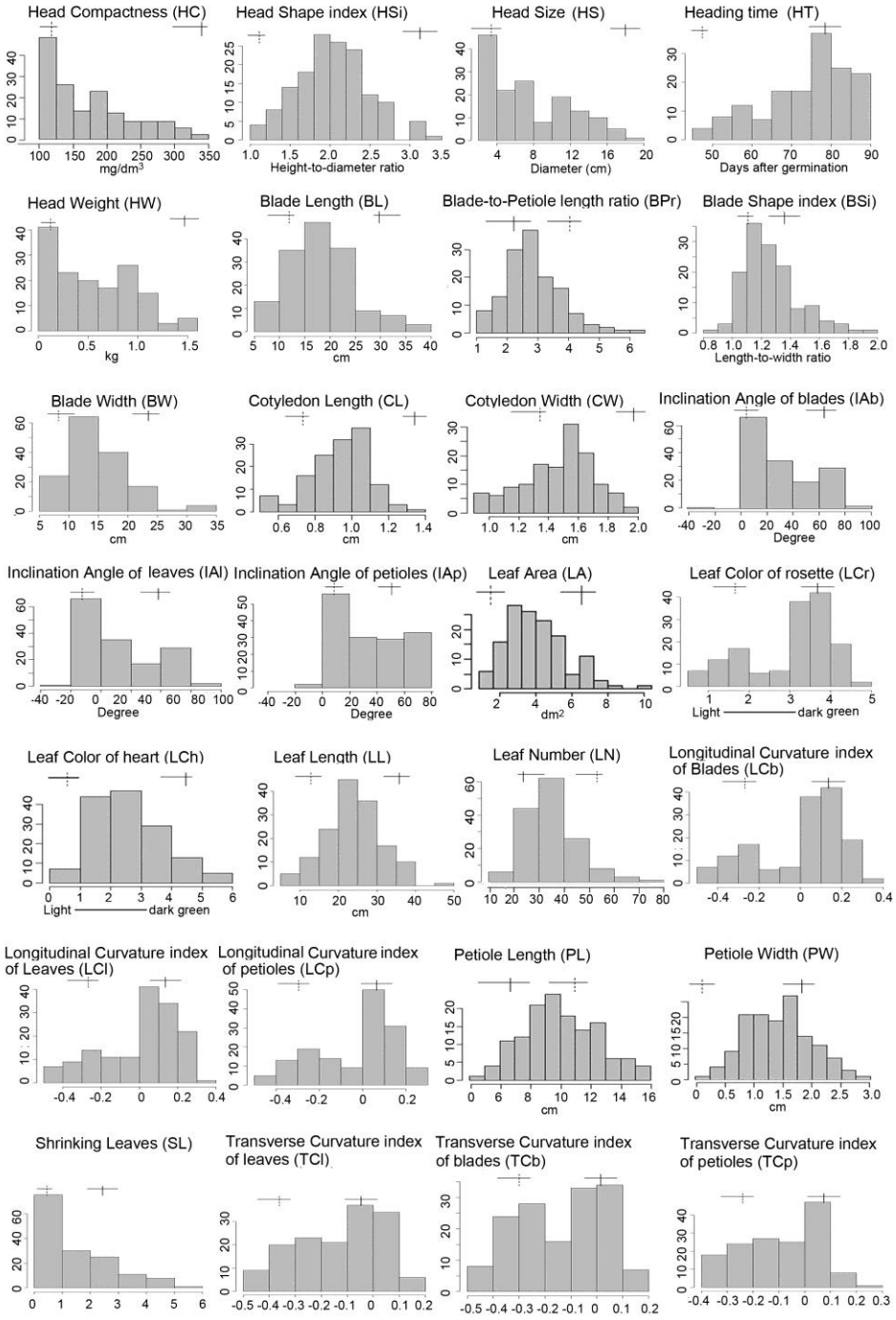


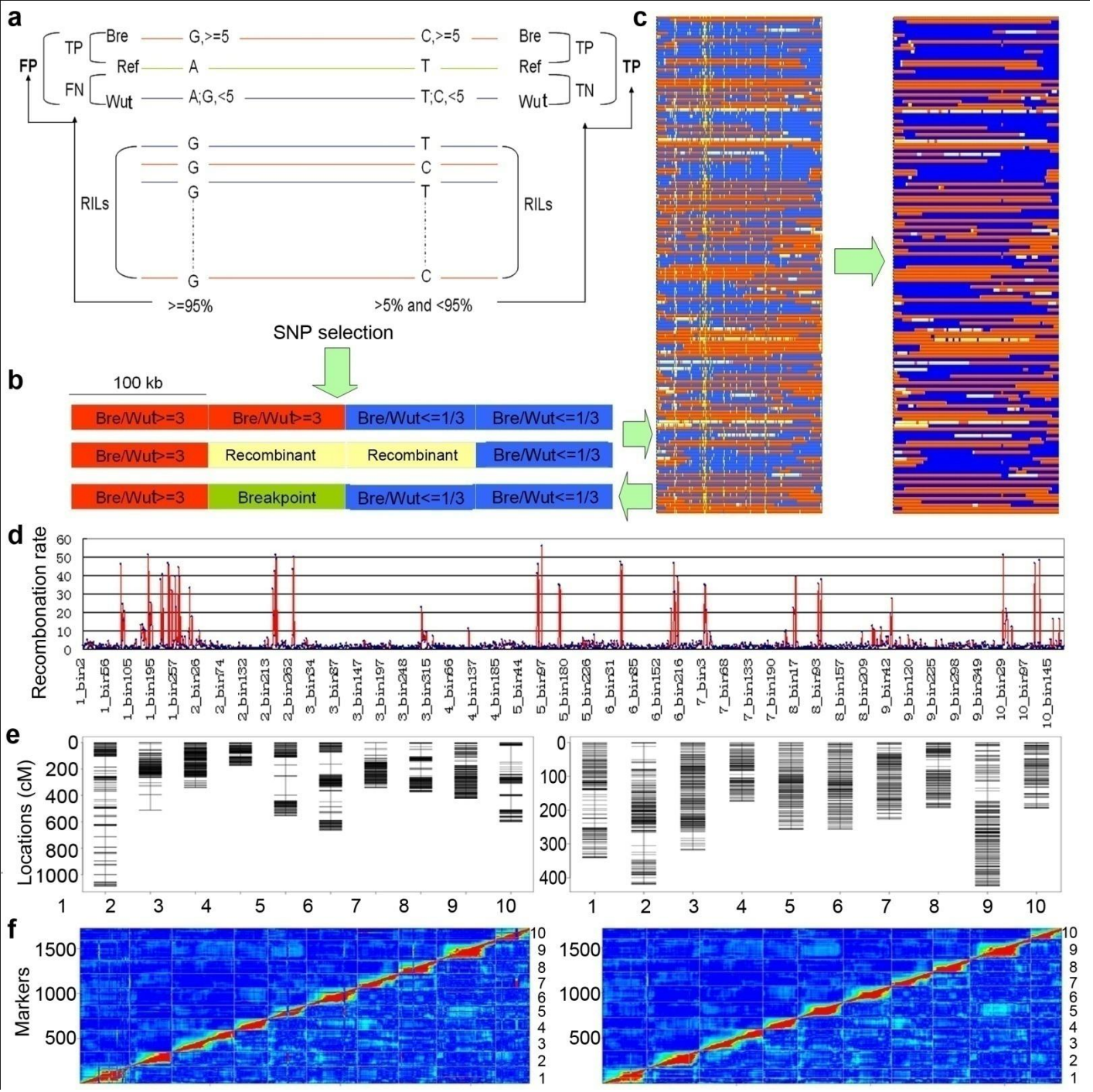



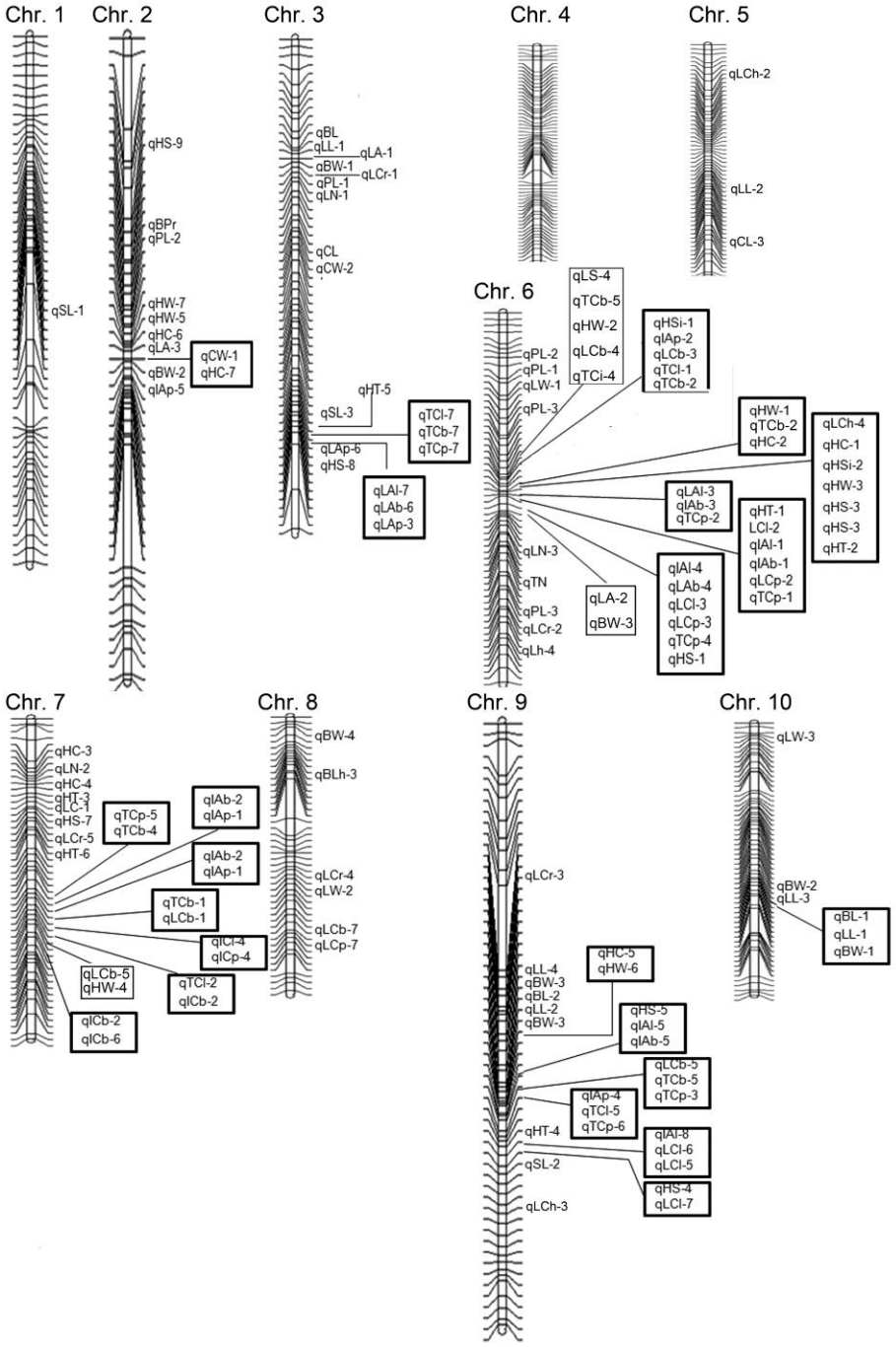

Three-dimensional leaf variance across 150 recombinant inbred lines (RILs), developed from a cross between heading and non-heading Chinese cabbage.



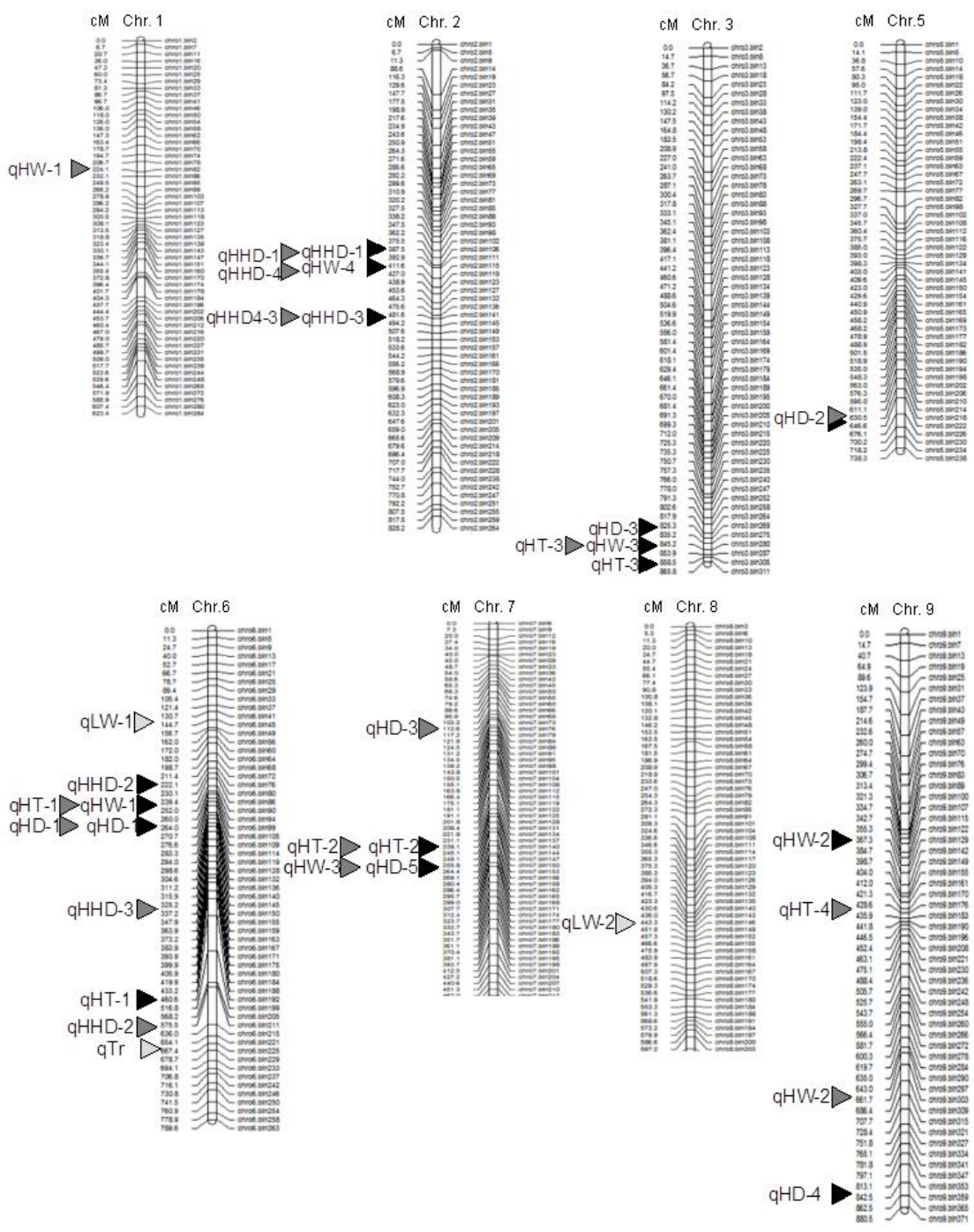

- 30 quantitative trait loci (QTLs) for five head traits

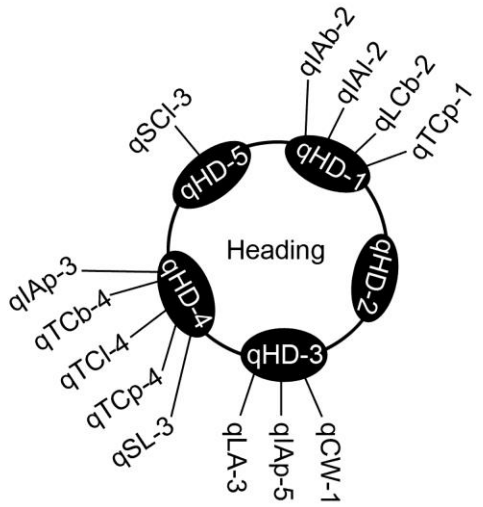



- 0.65 million high-quality SNPs (single nucleotide polymorphisms)




- generate the near-saturated genetic markers.
- 104 QTLs for twenty three leaf traits,



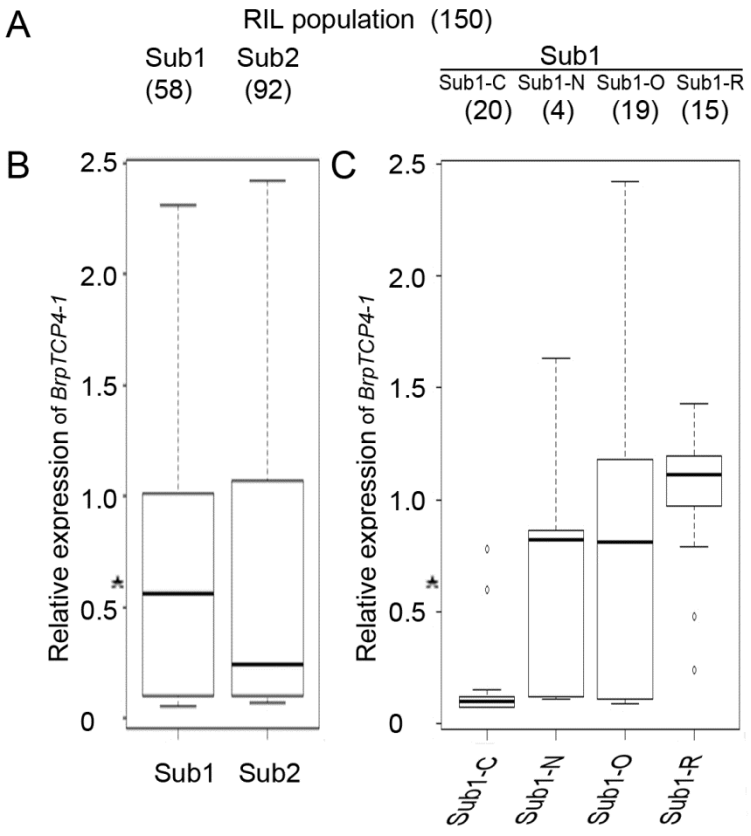




18 QTLs are identified for head shape, head size, head weight and heading time.
Head QTLs colocate with some leaf QTLs.

Yu et al., PLoS ONE, 2013， 8(10): e76059

# miR319a regulate the shape of leafy head in Chinese cabbage

**Boxplots of RIL subpopulations with different shapes of leafy heads.**



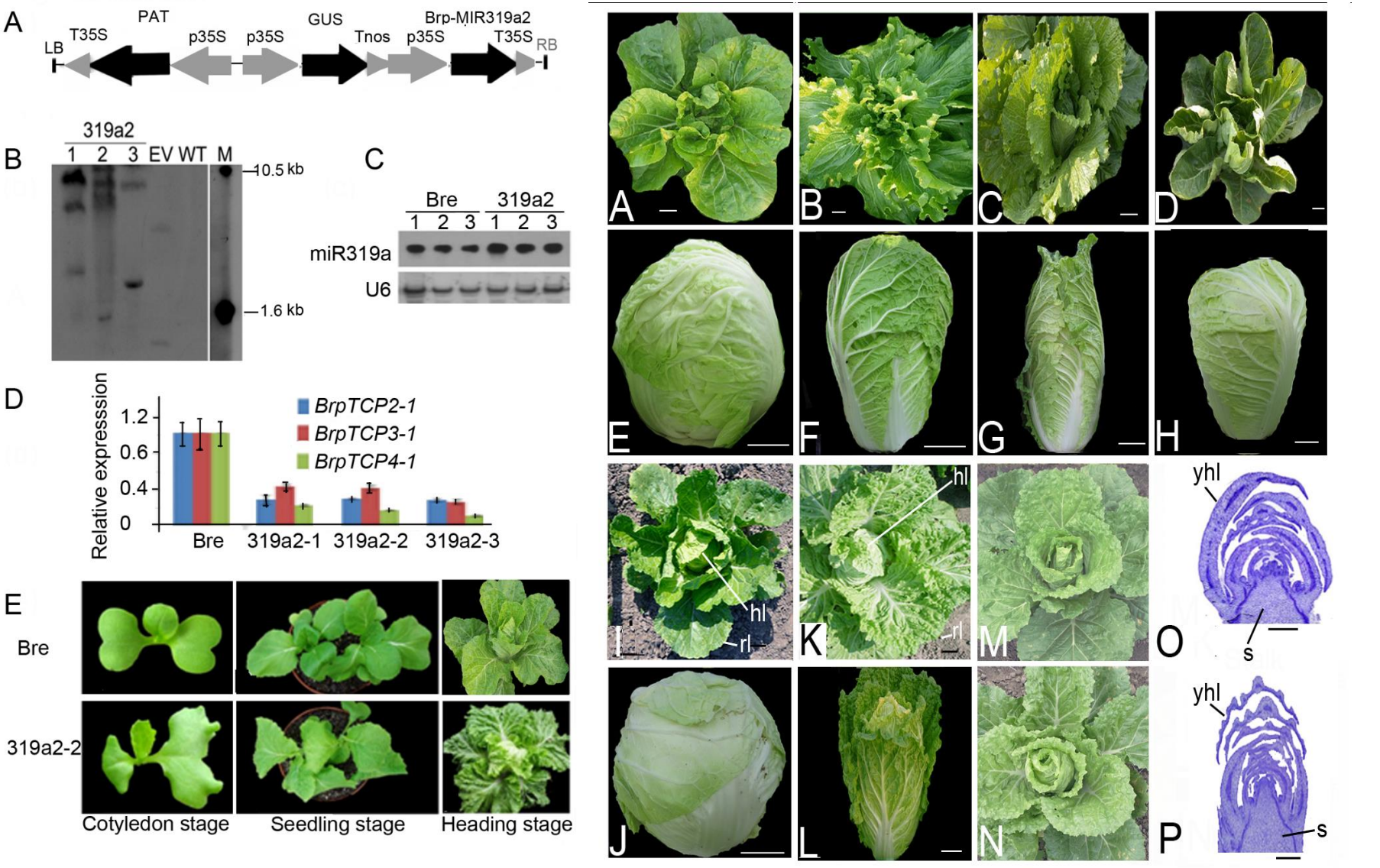

D

Kruskal-Wallis test

| | *P*-values | | *P*-values |
|---|---|---|---|
| Sub1 vs. Sub2 | 0.9317 | Sub1-C vs. Sub1-N | 0.0093 |
| | | Sub1-C vs. Sub1-O | 0.0007 |
| | | Sub1-C vs. Sub1-R | $1\times10^{-6}$ |
| | | Sub1-N vs. Sub1-O | 0.9149 |
| | | Sub1-N vs. Sub1-R | 0.1495 |
| | | Sub1-O vs. Sub1-R | 0.1104 |

We divided the RIL population into two subpopulations according to head compactness. 58 RILs had compact heads (Sub 1) and 92 RILs had loose heads (Sub2).

Head compactness was not associated with *BrpTCP4* expression. Round shape was associated with *BrpTCP4* expression.


A
LB
T35S
PAT
p35S
p35S
GUS
Tnos
p35S
Brp-MIR319a2
T35S
RB
B
319a2
1 2 3 EV WT M
10.5 kb
1.6 kb
C
Bre
319a2
1 2 3 1 2 3
miR319a
U6
D
Relative expresssion
1.2
0.6
0.4
0
BrpTCP2-1
BrpTCP3-1
BrpTCP4-1
Bre
319a2-1
319a2-2
319a2-3
E
Bre
319a2-2
Cotyledon stage
Seedling stage
Heading stage
A
B
C
D
E
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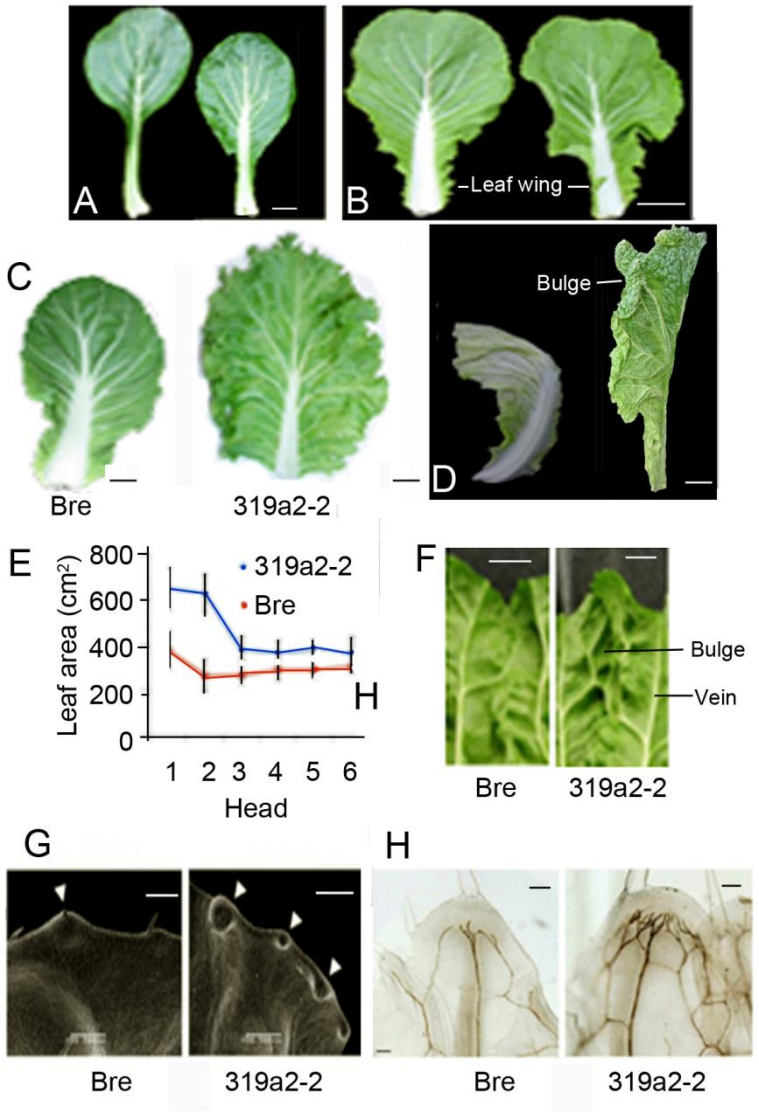
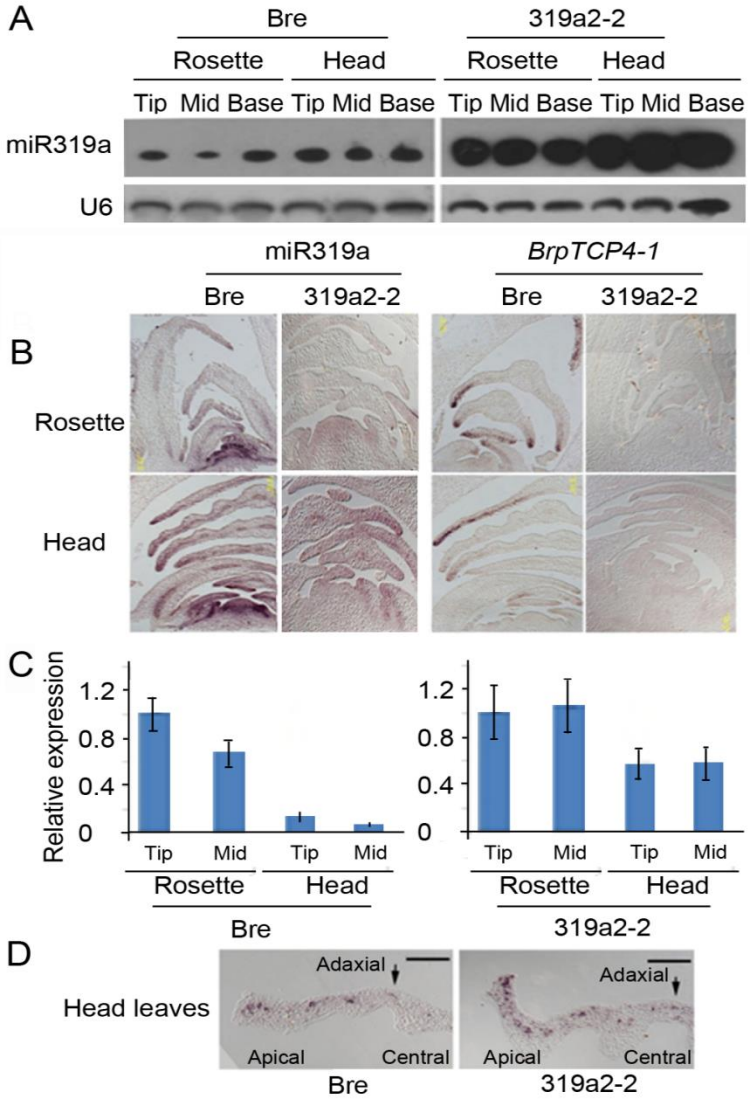
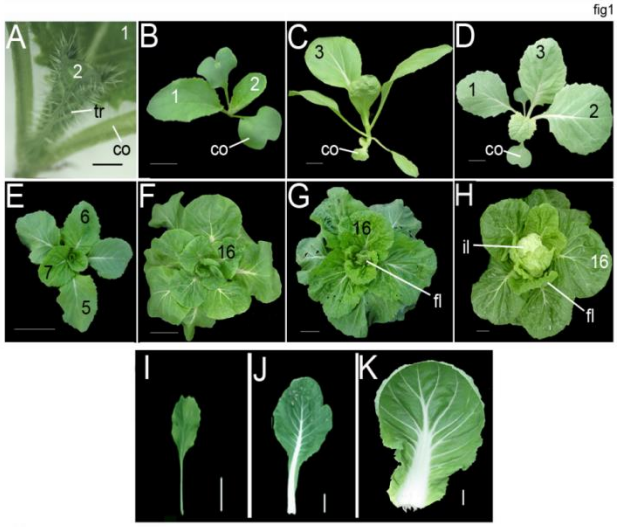


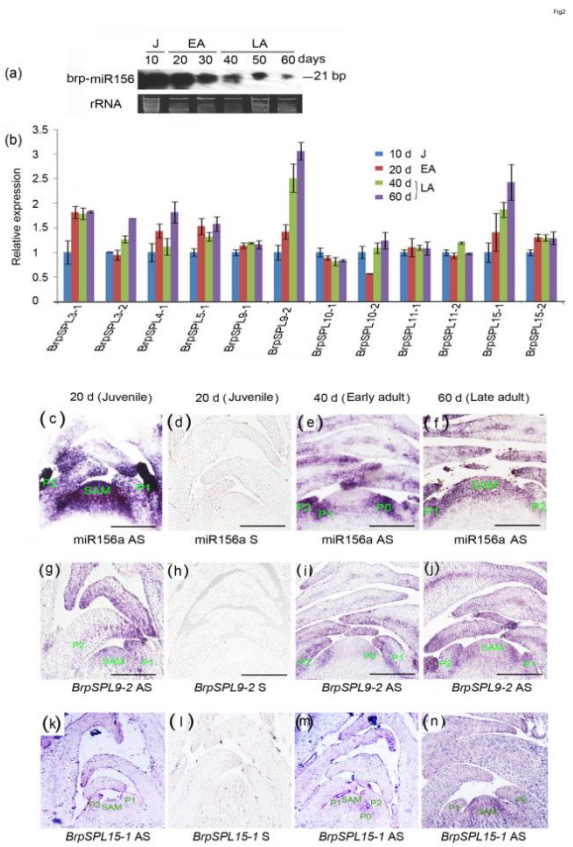



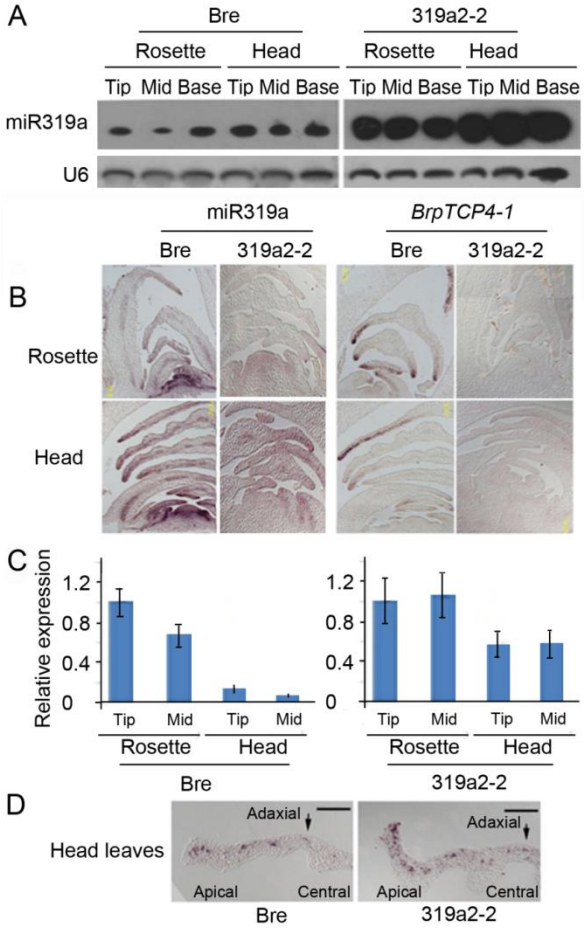

miR319a-targeted *BrpTCP* gene regulates the round shape of leafy head via differential cell division arrest in leaf regions.

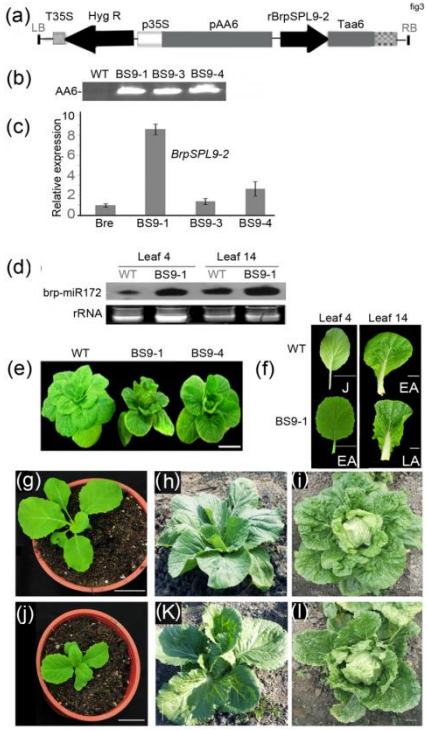
Mao et al., Plant Physiology 2014, 164(2):710-20

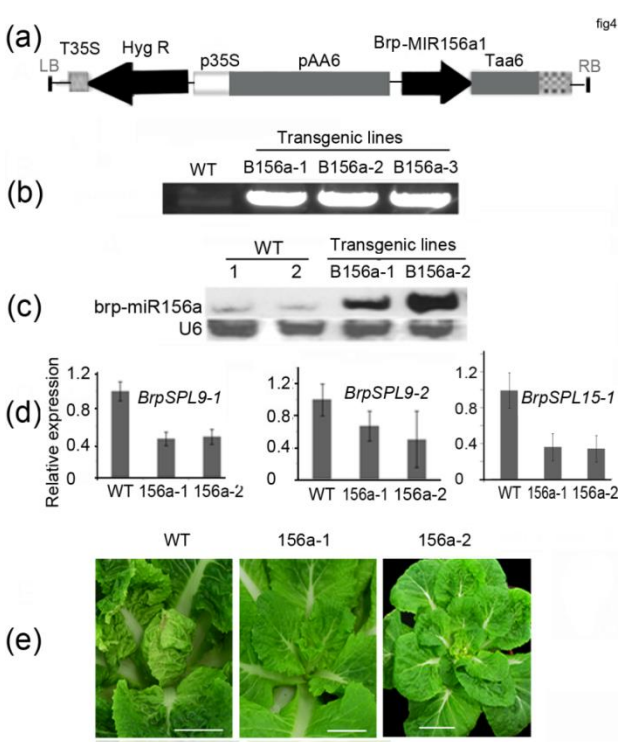
# *BrpSPL9* controls the earliness of heading time in Chinese cabbage



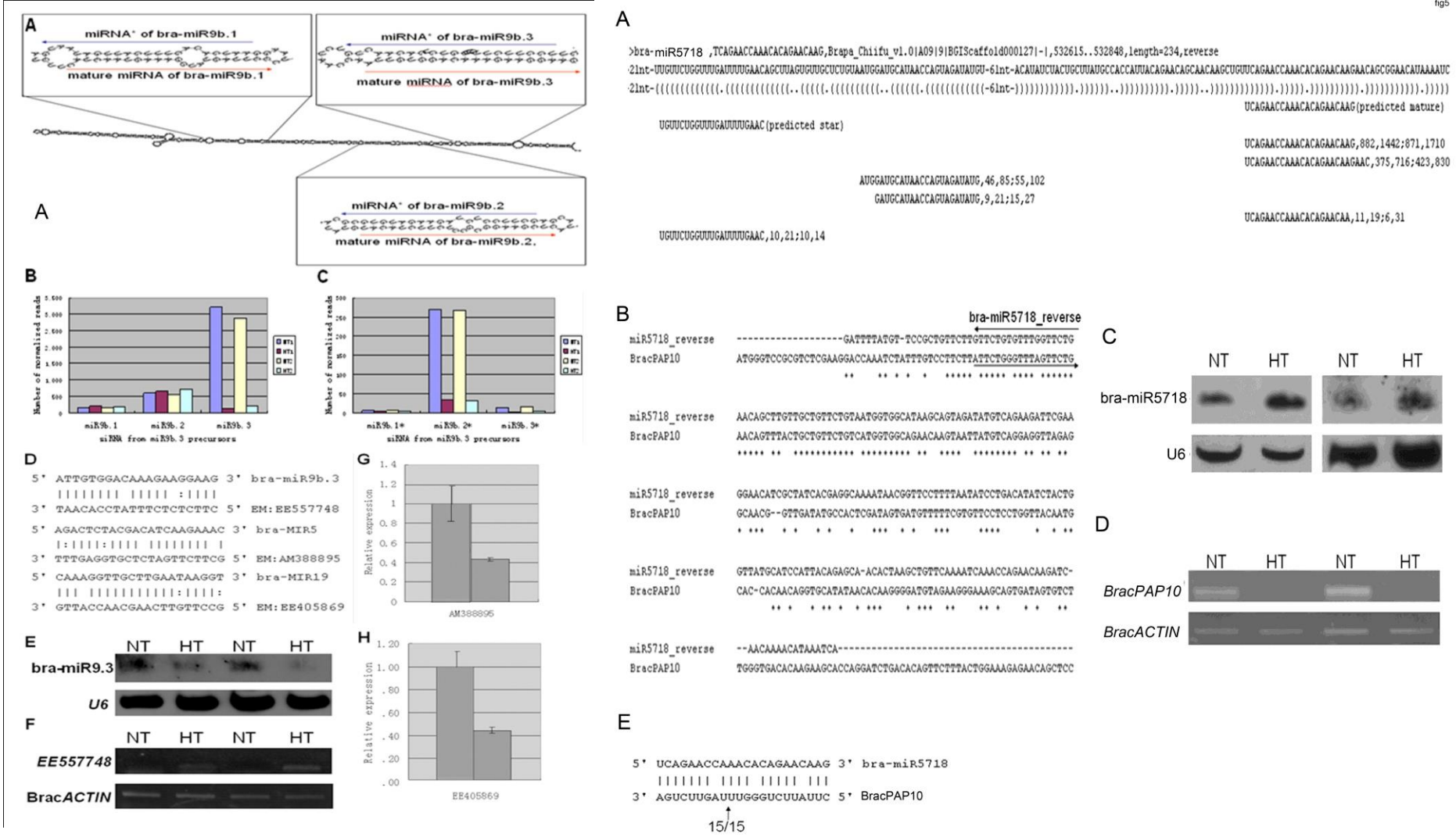



The significant earliness of heading in the transgenic plants overexpressing *BrpSPL9-2* gene was produced because the juvenile phase was absent and the early adult phase shortened, whereas the significant delay of folding in the transgenic plants overexpressing *Brp-MIR156a* was owing to prolongation of the juvenile and early adult phases.

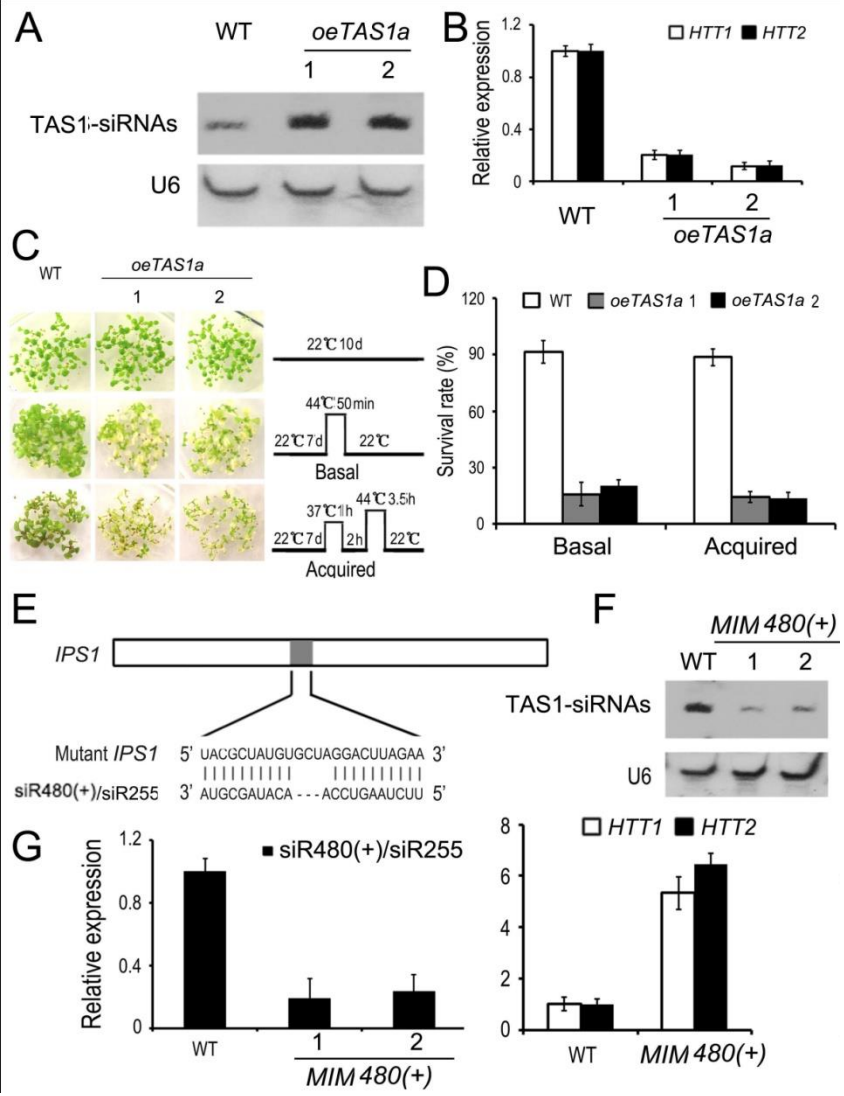
| Parameters | In growth room | | | In the field | |
|---|---|---|---|---|---|
| | WT | BS9-1 | B156a-1 | WT | BS9-1 |
| Days to folding | 25±1.8 | 15±1.3* | 37±2.6* | 46±3.5 | 35±2.4[a] |
| Days to heading | ND | ND | ND | 55±1.9 | 45±2.8[a] |
| Days to maturity | ND | ND | ND | 86±7.1 | 74±6.4 |
| Leaves to folding | 11±0.8 | 7±0.6* | 17±1.2* | 18±1.2 | 9±0.6[a] |
| Leaves to heading | ND | ND | ND | 23±1.8 | 17±2.2[a] |
| Leaves to maturity | ND | ND | ND | 43±3.6 | 37±2.7 |
| Number of juvenile leaves | 4±0.1 | 0* | 7±0.1* | 4±0.1 | 0[a] |
| Number of early adult leaves | 9±0.1 | 7±0.1* | 11±0.2* | 13±0.2 | 11±0.1[a] |
| Number of late adult leaves | ND | ND | ND | 26±1.4 | 28±1.6 |

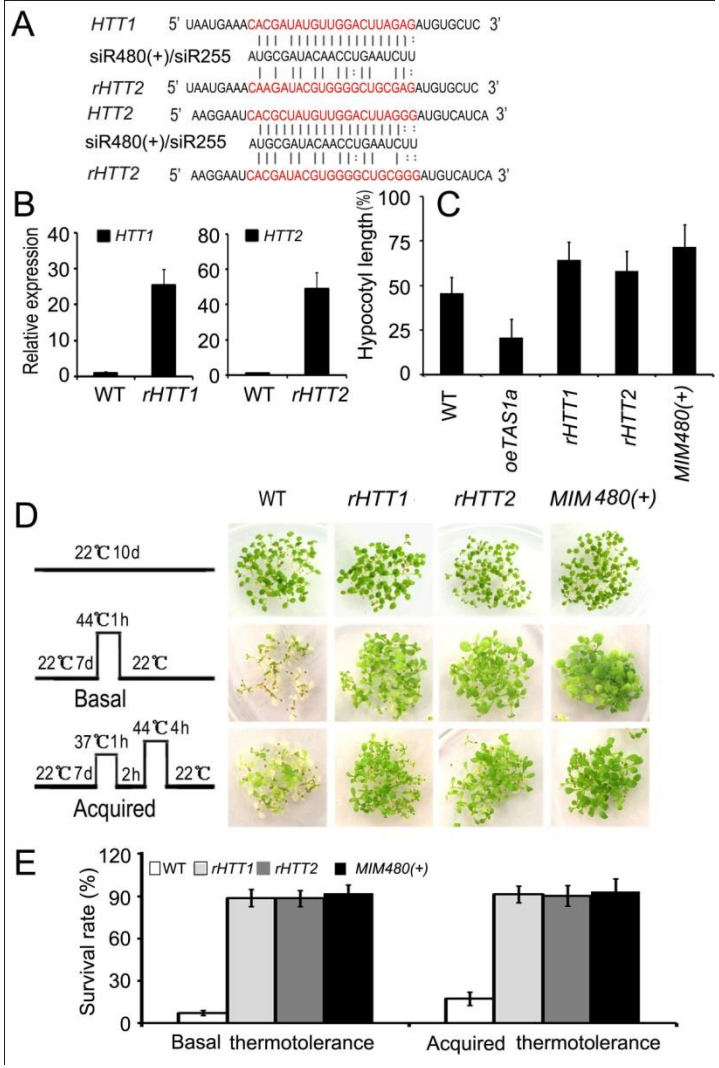
Wang et al., Plant Biotechnology Journal 2014, 12 (3), 312–321




10 miRNA families are responsive to heat stress. bra-miR398 accumulates less under heat stress while its target gene *bracCSD1* is up-regulated. Meanwhile, 2 miRNAs* (bra-miR167a* and bra-miR400*) are more sensitive to heat stress than the corresponding miRNAs.

***J Exp Bot*** 2012, 63, 1025–1038




*HTT1* mediates thermotolerance pathways because it is targeted by *TAS1a*, mainly activated by HsfA1a and act as co-factor of Hsp70-14 complexes.

Li et al., Plant Cell 2014. doi/10.1105/tpc.114.124883

# 致谢

研究人员：杨军（副研）；李晓荣（副研）；吴斐婕（助研）；钟蔚丽（助研）；白金娟（研实）

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钱锋; 任文青; Shirin Mirlohi

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