

## Supplementary Materials

Table S1. Pedigrees for the NILs targeting the 1HL and 4HL resistant loci used for the field assessments.

Genotype	Pedigree
CR1HL_1R	Lockyer//AWCS276/AWCS079 F9
CR1HL_1S	
CR1HL_3R	Commander//AWCS276/AWCS079 F8
CR1HL_3S	
CR1HL_7R	Commander//AWCS276/AWCS079 F8
CR1HL_7S	
CR1HL_8R	Commander//AWCS276/AWCS079 F8
CR1HL_8S	
CR1HL_9R	Commander//AWCS276/AWCS079 F8
CR1HL_9S	
CR4HL_1R	Baudin/AWCS276 F9
CR4HL_1S	
CR4HL_3R	Lockyer//AWCS276/AWCS079 F8
CR4HL_3S	
CR4HL_4R	Lockyer//AWCS276/AWCS079 F8
CR4HL_4S	
CR4HL_6R	Lockyer//AWCS276/AWCS079 F8
CR4HL_6S	
CR4HL_8R	Lockyer//AWCS276/AWCS079 F9
CR4HL_8S	

Table S2. Pedigrees of BC1 lines containing both 1HL and 4HL resistant loci used for the field assessment in 2017 and 2018.

No. of lines	Pedigree
BC1-01	Baudin/3/Commander//AWCS276/AWCS079-87/4/Fleet
BC1-02	Baudin/3/Commander//AWCS276/AWCS079-87/4/Baudin
BC1-03	Commander/3/Commander//AWCS276/AWCS079-87/4/Baudin
BC1-04	Grimmet/3/Commander//AWCS276/AWCS079-87/4/Baudin
BC1-05	Baudin/3/Commander//AWCS276/AWCS079-87/4/Lockyer
BC1-06	Fleet/3/Lockyer//AWCS276/AWCS079-189/4/Grimmet
BC1-07	Baudin/3/Lockyer//AWCS276/AWCS079-189/4/Grimmet
BC1-08	Commander/3/Lockyer//AWCS276/AWCS079-189/4/Grimmet
BC1-09	Franklin/3/Lockyer//AWCS276/AWCS079-189/4/Grimmet
BC1-10	Lockyer/3/Lockyer//AWCS276/AWCS079-189/4/Commander

Table S3. Pedigrees of BC3 lines containing both 1HL and 4HL resistant loci assessed in 2018.

Lines	Pedigree
BC3-01	Westminster/5/Commander/4/Baudin/3/Commander//AWCS276/AWCS079-87
BC3-02	Westminster/5/Commander/4/Commander/3/Lockyer//AWCS276/AWCS079-189
BC3-03	Westminster/5/Commander/4/Fleet/3/Commander//AWCS276/AWCS079-33
BC3-04	Commander/5/Westminster/4/Baudin/3/Commander//AWCS276/AWCS079-87
BC3-05	Commander/5/Westminster/4/Commander/3/Lockyer//AWCS276/AWCS079-189
BC3-06	Commander/5/Westminster/4/Fleet/3/Commander//AWCS276/AWCS079-33
BC3-07	Compass/5/La Trobe/4/Baudin/3/Commander//AWCS276/AWCS079-87
BC3-08	Compass/5/La Trobe/4/Commander/3/Lockyer//AWCS276/AWCS079-189
BC3-09	Compass/5/La Trobe/4/Fleet/3/Commander//AWCS276/AWCS079-33
BC3-10	La Trobe/5/Compass/4/Baudin/3/Commander//AWCS276/AWCS079-87
BC3-11	La Trobe/5/Compass/4/Commander/3/Lockyer//AWCS276/AWCS079-189
BC3-12	La Trobe/5/Compass/4/Fleet/3/Commander//AWCS276/AWCS079-33
BC3-13	Compass/5/Lockyer/4/Baudin/3/Commander//AWCS276/AWCS079-87
BC3-14	Compass/5/Lockyer/4/Commander/3/Lockyer//AWCS276/AWCS079-189
BC3-15	Compass/5/Lockyer/4/Fleet/3/Commander//AWCS276/AWCS079-33

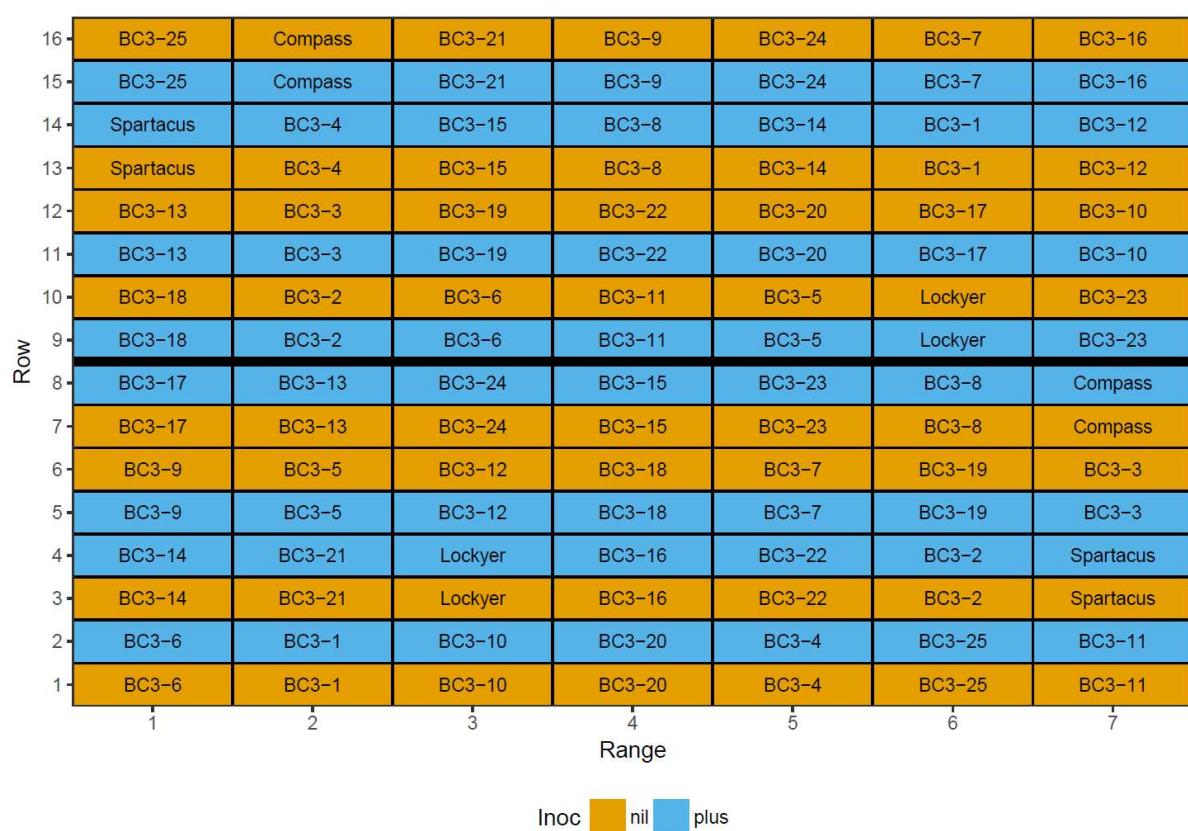
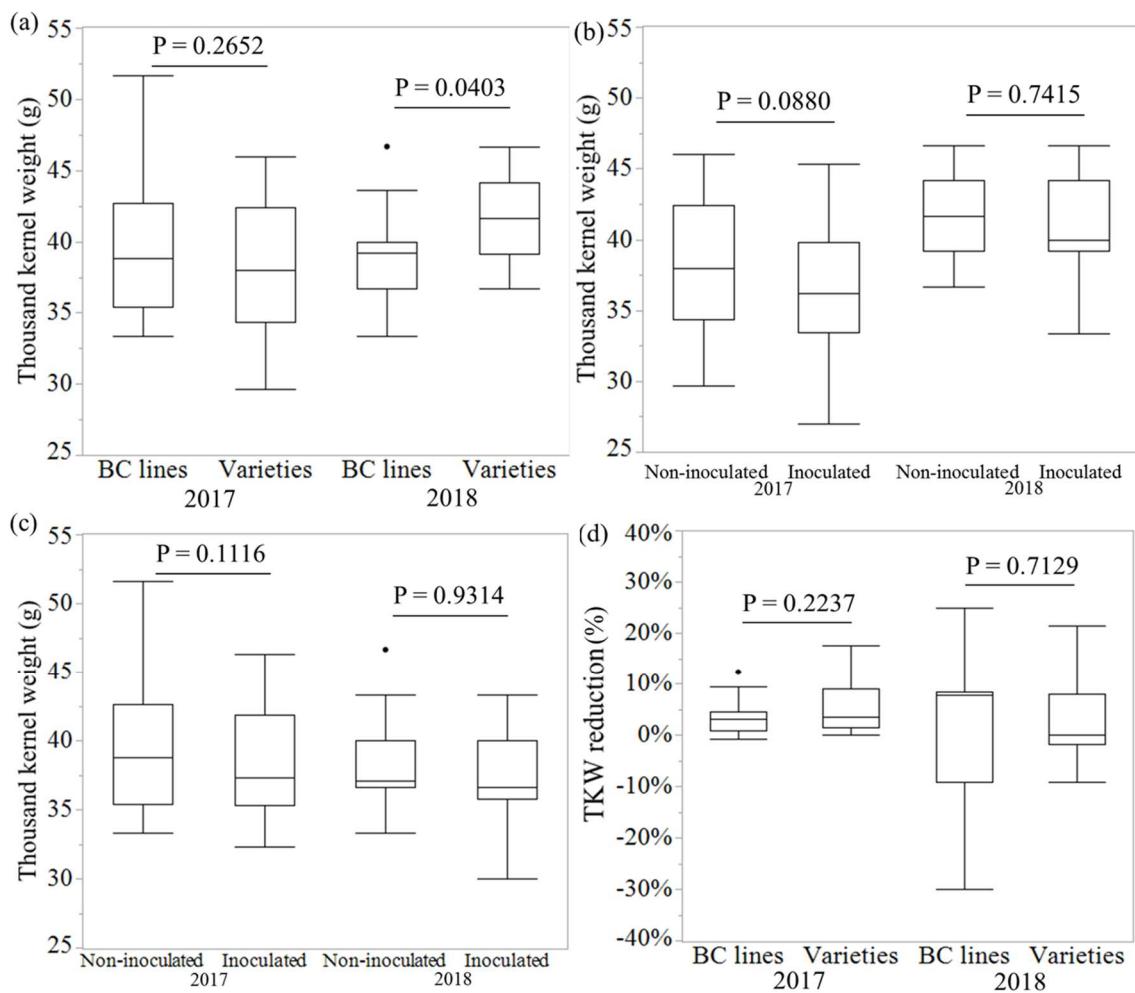


Figure S1. An example of trial layout in one of the field sites. nil represents non-inoculated treatment and plus represents *Fp*-inoculated treatment



**Figure S2.** Box plot distributions of TKW differences between BC lines and local varieties in the non-inoculated treatment (a), differences in local varieties between non-inoculated and *Fp*-inoculated treatments (b), differences in BC lines between non-inoculated and *Fp*-inoculated treatments (c), and differences in TKW loss between BC lines and local varieties with one way ANOVA student's *t* test (P-value are provided). Boxes indicate the 25 and 75 percentiles, respectively; the median is indicated by the solid horizontal line. Whiskers represent the range and black dots the outliers.