

Descriptions of Additional Supplementary Files

Supplementary Data 1

Description: Sequencing datasets generated in this study

Supplementary Data 2

Description: A catalogue of 21- and 24-nt PHAS loci

Supplementary Data 3

Description: Abundances of phasiRNAs in embryos, spikelets and germ cells

Supplementary Data 4

Description: Abundances of phasiRNAs in early prophase I meiocytes of *osrd6-2* and *mel1-4* and their respective wild-type plants

Supplementary Data 5

Description: 21-nt phasiRNA targets validated by degradome sequencing

Supplementary Data 6

Description: Degradome counts at cleavage sites of validated 21-nt phasiRNA targets in *osrd6-2*, *mel1-4* and their respective wild-type plants

Supplementary Data 7

Description: Expression levels of validated 21-nt phasiRNA targets in the early prophase I meiocytes of *osrd6-2* and *mel1-4* and their respective wild-type plants