Supplemental Data

Supplemental Tables S1 ~ S2

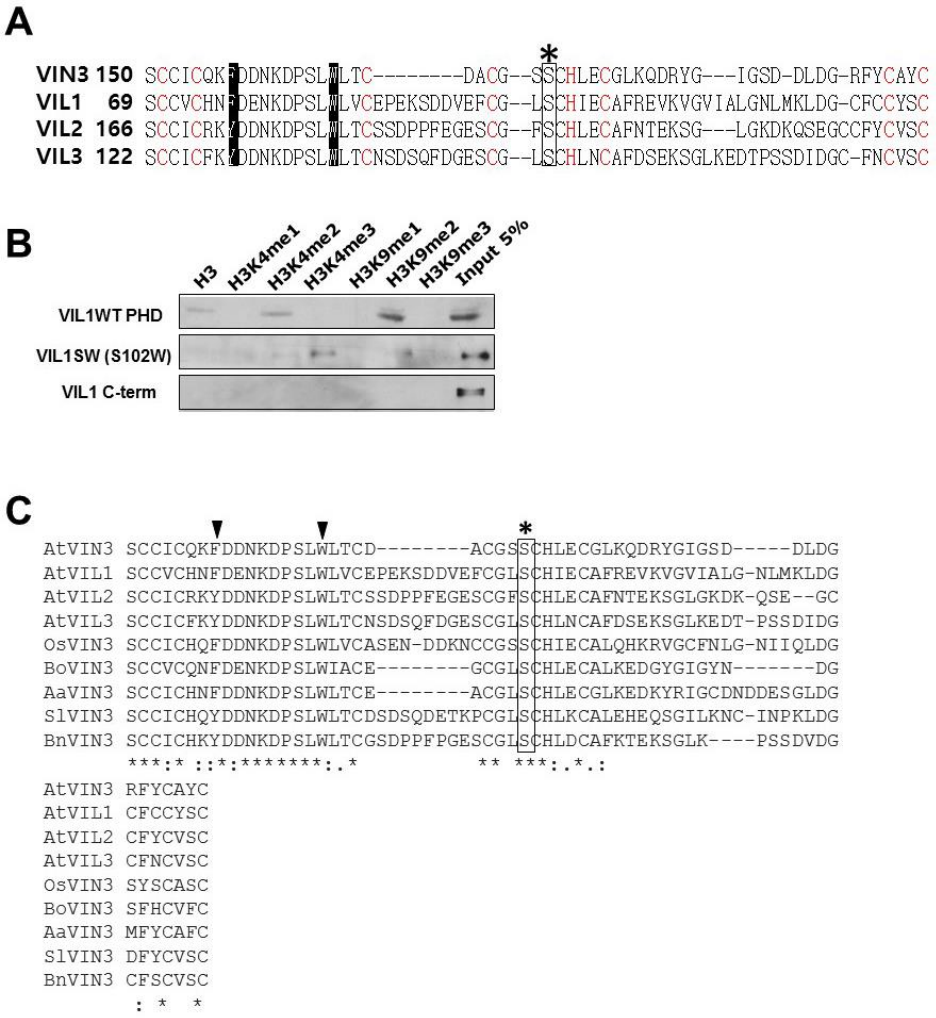
Supplemental Figures S1 ~ S4

Supplemental Table S1. Oligonucleotides used in this study

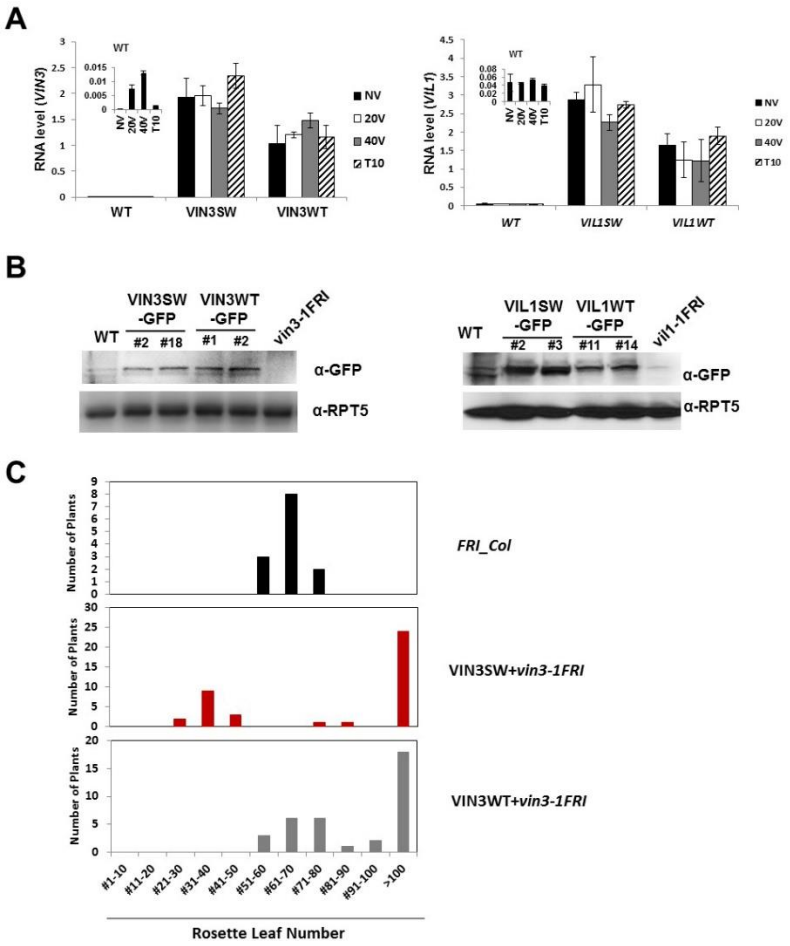
Name	Forward sequence	Reverse sequence	Usage
FLC	GCCAAGAAGACCGAACTCATGTTGA	CAACCGCCGATTTAAGGTGGCTA	qRT-PCR
VIN3	AGAAGCTGTGTTCTCAGGCAATGG	TCTTCGTCCTTCGACTTTCGACAAA	qRT-PCR
VIL1	TGAAGTTGGACCTCTTGATGGACCT	CTGCACGCAGCTGGAACTAAATCTC	qRT-PCR
FT	GGAACAACCTTTGGCAATGAGAT	CTGCCAAGCTGTCGAAACAA	qRT-PCR
SOC1	TGGGAGAAGGCATAGGAACATGC	CGCTTTCATGAGATCCCCACTTTTC	qRT-PCR
PP2A	TATCGGATGACGATTCTTCGTGCAG	GCTTGGTCGACTATCGGAATGAGAG	qRT-PCR
FLC-P1	TGTAGGCACGACTTTGGTAACAC	TTTTCACTTTCGTTGCTAAATGAAAACTATCTTTC	ChIP-qPCR
FLC-P2	CTTAGTATCTCCGGCGACTTGAACC	GCGTCACAGAGAACAGAAAGCTGA	ChIP-qPCR
FLC-P3	TACAACCCTCCAATATAATAACCAAATGGTTG	CACGTTCTAAAAGGCTTCTTCTTTATTAAATC	ChIP-qPCR
FLC-P4	GTGAATAGTGATTTTGACCTATGATTATCGTACAG	GGTGGCTAATTAAGTAGTGGGAGAGTCAC	ChIP-qPCR
PP2A_ChIP	AGCCTTTATACCCGATTGCTGTGCTTATCG	CCTCTCCTCTCCAAGAGCACGAGC	ChIP-qPCR
AG_ChIP	GTGAAACAAATTTTCCTGCAGAATGTCACT	AGTTTTTGAGGCACTAAAATCTTTGGGTAAATC	ChIP-qPCR
VIN3 PHD	CACCTGTGAGAATTTAGCTTGTAGAGCTGCGCT	CAGAGCTTCCATTGCCTGAGAACACAGCT	Rec. protein
VIL1 PHD	CACCTGCAAGAATGCATCGTGTAGAGCTAATGT	TGCCTTTTTAATTGCAGAAGTGCAAAGCT	Rec. protein
VIN3 CDS	CACCATGCAAGCTGCTTCGCTCTCAAAGATC	ATGCCAAAGCTTGAGGCAGATCCC	Construct
VIL1 CDS	CACCATGGATTCATCATCGACGAAATCGAAGATCTCAC	ATGTGAGGTCATTACTCCATTGTTTGGCCTTTTG	Construct
VIN3_SW	TggTGTCATTTGGAATGTGGTTTGAAGC	ATGACAccACGATCCACAAGCATCACAAGT	Construct
VIL1_SW	TGGTGTCACATTGAGTGTGCTTTTCGAGAAGTC	CACTCAATGTGACACCATAAGCCACAGAACTC	Construct
COLDAIR	CACCCTTTGTTCCTATTCGTTAAAATTGACAATCCACAACC	AACATATACGAGAAAACTTTTCGGATTTTTCAATGAACC	Construct

Supplemental Table S2. Biotinylated histone peptides used in this study.

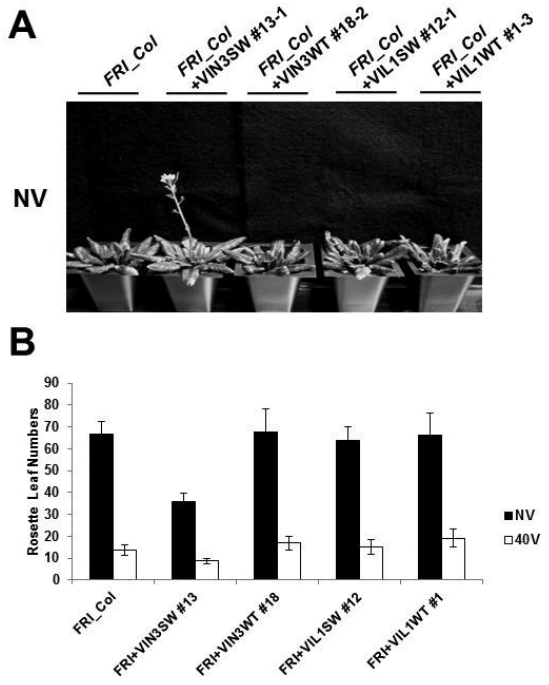
Histone peptide, Biotin conjugate	Cat. No.	Company
H3 (1-21)	12-403	MILLIPORE
H3K4me1	12-563	MILLIPORE
H3K4me2	12-430	MILLIPORE
H3K4me3	12-564	MILLIPORE
H3K9me1	12-569	MILLIPORE
H3K9me2	12-430	MILLIPORE
H3K9me3	12-568	MILLIPORE



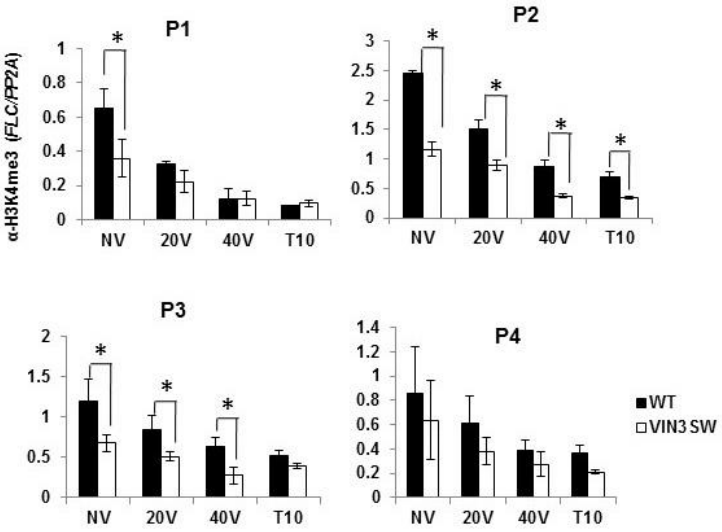
Supplemental Figure S1. PHD-finger domains of VIN3 family proteins. (A) Multiple alignments of PHD-finger domains of VIN3 family proteins in Arabidopsis. Two aromatic ring residues (F and W, indicated by black boxex) and a polar charged Serine residue (S, indicated by *) are conserved in VIN3 family proteins. **(B)** *In vitro* histone peptides binding assays using His-tagged recombinant wild-type VIL1 (VILWT) and modified VIN3 (VIL1SW) proteins. **(C)** Multiple alignments of PHD finger domain VIN3 family proteins in Arabidopsis and other plant species. Two hydrophobic aromatic ring residues (F/Y and W, indicated by *downward arrowheads*) and a polar charged Serine residue (S, indicated by *asterisk*) are conserved in all VIN3 family of proteins in plant species. BnVIN3 (*Brassica napus* VIN3, NCBI protein number: XP_013727218), OsVIN3 (*Oryza Sativa* VIN3, NCBI protein number: XP_015639862), BoVIN3 (*Brassica Oleracea* VIN3, NCBI protein number: XP_013629072), AaVIN3 (*Arabis alpina* VIN3, NCBI protein number: AGU09528), SlVIN3 (*Solanum Lycopersicum* VIN3, NCBI protein number:XP_004238003)



Supplemental Figure S2. Characterization of VIN3SW, VIN3WT, VIL1SW, and VIL1WT transgenic lines. (A) The mRNA levels of *VIN3* and *VIL1* were determined by real-time RT-PCR during vernalization. Insets show mRNA levels of *VIN3* and *VIL1* in the wild-type *FRI_Col* plants during vernalization. *PP2A* (at1g13320) was used as a control for qRT-PCR analyses. Data (relative levels; mean ± SD of quantitative RT-PCR; *n* = 3) **(B)** Detection of VIN3-GFP and VIL1-GFP protein from each two representative transgenic lines. Non-vernalized; NV, 20 days of vernalization; 20V, 40 days of vernalization; 40V, and 40 days of vernalization followed by 10 days of normal growth temperature; T10. WT; *FRI_Col*, VIN3SW; VIN3SW in *vin3-1FRI* plants, VIN3WT; VIN3WT in *vin3-1FRI* plants. **(C)** Flowering times of T1 primary transgenic plants of VIN3SW in *vin3-1FRI* (*n*=40) and VIN3WT in *vin3-1FRI* (*n*= 36) compared to the wild-type (*FRI_Col*).



Supplemental Figure S3. The introduction of VIN3SW transgene into *FRI*_Col wild-type plants also triggers accelerated flowering. (A) Early flowering of homozygous VIN3SW transgenic lines in *FRI*_Col background at NV condition. **(B)** Measurement of rosette leaf numbers of each transgenic plants in *FRI*_Col background at both NV and 40V condition (non-vernalized; NV and 40 days vernalized; 40V; *n*=12). Plants were grown under long-day condition (16 hours light and 8 hours dark) after vernalization treatment.



Supplemental Figure S4. Changes in H3K4me3 at *FLC* chrmatin during vernalization. A schematic representation of genomic structure of *FLC* and relative positions of the primers used in ChIP assays are shown (P1 ~ P4) is shown in Figure 4A. Data (mean ± SD of quantitative PCR; *n*=3). Statistically significant changes are indicated by asterisks (Student's t-test, P < 0.01). Non-vernalized; NV, 20 days of vernalization; 20V, 40 days of vernalization; 40V, and 40 days of vernalization followed by 10 days of normal growth temperature; 40VT10. WT; *FRI*_Col, VIN3SW; VIN3SW in *vin3-1FRI* plants.