

Table S1. RGB-based and multispectral-based VIs.

| ID | Name | Equation | Reference |
|-----|---------|--|------------------|
| r1 | EXG | $2 \times G - R - B$ | [31] |
| r2 | GRAY | $0.2898 \times R + 0.5870 \times G + 0.1140 \times B$ | [32] |
| r3 | GLI | $\frac{2 \times G - R - B}{2 \times G + R + B}$ | [33] |
| r4 | MRBVI | $\frac{R^2 - B^2}{R^2 + B^2}$ | [34] |
| r5 | IKAW | $\frac{R - B}{R + B}$ | [35] |
| r6 | NGBDI | $\frac{G - B}{G + B}$ | [36] |
| r7 | DRBVI | $\frac{R - B}{R + G + B}$ | [37] |
| r8 | DGBVI | $\frac{G - B}{R + G + B}$ | [37] |
| r9 | GBDI | $\frac{G - B}{G + B}$ | [38] |
| r10 | GCC | $\frac{R}{R + G + B}$ | [39] |
| r11 | CIVE | $0.441 \times R - 0.881 \times G - 0.385 \times B + 18.7845$ | [40] |
| r12 | MGRVI | $\frac{G^2 - R^2}{G^2 + R^2}$ | commonly applied |
| r13 | MNGRVI | $\frac{G^2 - R \times G}{G^2 + R \times G}$ | commonly applied |
| r14 | MNGRBVI | $\frac{B^2 - R \times G}{B^2 + R \times G}$ | commonly applied |

| ID | Name | Equation | Reference |
|-----|-------------|---|-----------|
| m1 | GNDVI | $\frac{NIR - G}{NIR + G}$ | [41] |
| m2 | LCI | $\frac{NIR - RE}{NIR + R}$ | [42] |
| m3 | NDRE | $\frac{NIR - RE}{NIR + RE}$ | [43] |
| m4 | OSAVI | $\frac{NIR - R}{NIR + R + 0.16}$ | [44] |
| m5 | NDVI | $\frac{NIR - R}{NIR + R}$ | [45] |
| m6 | IPVI | $\frac{NIR}{NIR + R}$ | [46] |
| m7 | NIRV | $\frac{NIR - R}{NIR + R} \times NIR$ | [47] |
| m8 | MCARI | $(NIR - RE) - 0.2 \times \frac{(NIR - R) \times R}{RE}$ | [48] |
| m9 | MRGBVI | $\frac{RE + 2 \times G - 2 \times B}{RE + 2 \times G + 2 \times B}$ | [15] |
| m10 | MRNGBV I | $\frac{RE + G - B}{RE + G + B}$ | [15] |
| m11 | MRNRVI | $\frac{NIR - R}{RE - R}$ | [15] |
| m12 | MTCI | $\frac{NIR - RE}{RE - R}$ | [30] |

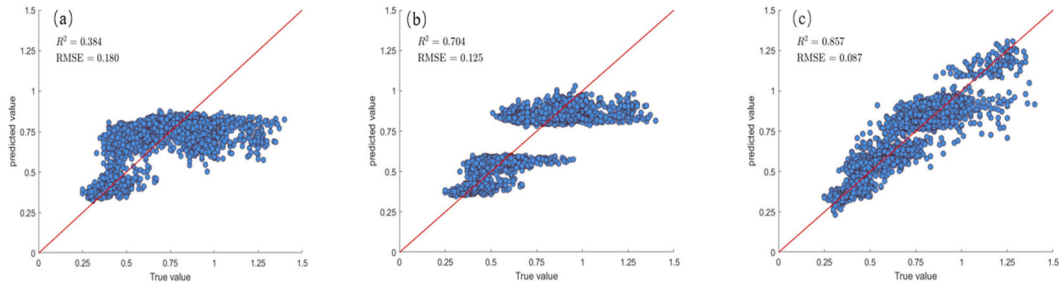


Figure S1. Scatterplot of all plant height predictions and true values based on vegetation index MTCI. (a) TLR model predictions; (b) two-stage model predictions; (c) results of all clusters after clustering using two-stage model parameters.

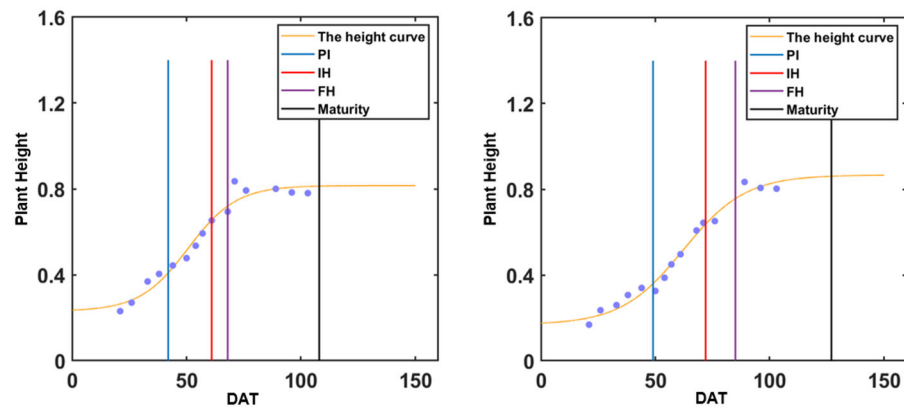


Figure S2. The plot height curve based on the estimated plant height by DSM. PI stands for panicle initiation stage, IH stands for initial heading stage, FH stands for full heading stage and the height curve is fitted by logistic equation.