Supplementary Material

S1. Calibration of the WOFOST model

Table S1. Values of soil parameters for WOFOST model

Parameter	Description	Units	Value
SMW	soil moisture content at wilting point	cm^3/cm^3	0.072
SM0	soil moisture content of saturated soil	cm^3/cm^3	0.426
SMFCF	soil moisture content at field capacity	cm^3/cm^3	0.283
CRAIRC	critical soil air content for aeration	cm^3/cm^3	0.06
SSI	initial surface storage of water	cm	0
SMLIM	maximum moisture content in topsoil	cm	0.04
WAV	initial available water in total root-exploitable soil	cm	20
K0	hydraulic conductivity of saturated soil	cm/day	10
SOPE	maximum percolation rate in the root zone	cm/day	10
KSUB	maximum percolation rate of water into subsoil	cm/day	10

Table S2. Values of crop parameters for WOFOST model

Parameter	Description	Units	Value
Phenology			
DLO	optimum day length for development	h	14
DLC	critical day length	h	8
TSUM1	cumulative temperature from emergence to anthesis	℃	981.0
TSUM2	cumulative temperature from anthesis to maturity	℃	785.1
Initial condition			
TDWI	initial total crop dry weight	kg/ha	210
LAIEM	leaf area index at emergence	ha/ha	0.13
RGRLAI	maximum relative rate of increase in LAI	ha/ha/day	0.00817
Green area			
SLATB000	specific leaf area at DVS = 0	ha/kg	0.00202
SLATB070	specific leaf area at DVS = 0.7	ha/kg	0.00261
SLATB160	specific leaf area at DVS = 1.6	ha/kg	0.00185
SLATB200	specific leaf area at DVS = 2	ha/kg	0.00185
SPAN	life span of leaves growing at 35 ℃	days	27
TBASE	lower threshold temperature for aging of leaves	℃	0
Assimilation			
KDIFTB000	extinction coefficient for diffuse visible light(DVS = 0)	-	0.6
KDIFTB200	extinction coefficient for diffuse visible light(DVS = 2)	-	0.6
EFFTB00	light-use efficiency of a single leaf (T = 0 ℃)	$kg/ha/h/J{\cdot}m^2{\cdot}s$	0.45
EFFTB40	light-use efficiency of a single leaf (T = 40 ℃)	$kg/ha/h/J{\cdot}m^2{\cdot}s$	0.45
AMAXTB000	maximum leaf CO_2 assimilation rate (DVS = 0)	kg/ha/h	45
AMAXTB100	maximum leaf CO_2 assimilation rate (DVS = 1)	kg/ha/h	45
AMAXTB130	maximum leaf CO_2 assimilation rate (DVS = 1.3)	kg/ha/h	45
AMAXTB200	maximum leaf CO_2 assimilation rate (DVS = 2)	kg/ha/h	4.8
TMPFTB00	reduction factor of AMAX (T = 0℃)	-	0.01
TMPFTB10	reduction factor of AMAX (T = 10℃)	-	0.60

TMPFTB15	reduction factor of AMAX (T = 15°C)	-	0.85
TMPFTB25	reduction factor of AMAX (T = 25°C)	-	1
TMPFTB35	reduction factor of AMAX (T = 35°C)	-	0.85
TMPFTB45	reduction factor of AMAX (T = 45°C)	-	0
Conversion of assimilated into biomass			
CVL	efficiency of conversion into leaves	kg/kg	0.740
CVO	efficiency of conversion into storage	kg/kg	0.809
CVR	efficiency of conversion into roots	kg/kg	0.694
CVS	efficiency of conversion into stems	kg/kg	0.762
Maintenance respiration			
Q10	relative change in respiration rate per 10 °C increase	-	2
RML	relative maintenance respiration rate of leaves	kg CH_2O/kg/d	0.030
RMO	relative maintenance respiration rate of storage	kg CH_2O/kg/d	0.010
RMR	relative maintenance respiration rate of roots	kg CH_2O/kg/d	0.015
RMS	relative maintenance respiration rate of stems	kg CH_2O/kg/d	0.015
Partitioning			
FRTB000	fraction of total dry matter to roots at DVS = 0	kg/kg	0.50
FRTB040	fraction of total dry matter to roots at DVS = 0.40	kg/kg	0.17
FRTB070	fraction of total dry matter to roots at DVS = 0.70	kg/kg	0.07
FRTB090	fraction of total dry matter to roots at DVS = 0.90	kg/kg	0.03
FRTB120	fraction of total dry matter to roots at DVS = 1.20	kg/kg	0
FRTB200	fraction of total dry matter to roots at DVS = 2	kg/kg	0
FLTB000	fraction of total dry matter to leaves at DVS = 0	kg/kg	0.682
FLTB015	fraction of total dry matter to leaves at DVS = 0.15	kg/kg	0.560
FLTB025	fraction of total dry matter to leaves at DVS = 0.25	kg/kg	0.623
FLTB050	fraction of total dry matter to leaves at DVS = 0.50	kg/kg	0.310
FLTB065	fraction of total dry matter to leaves at DVS = 0.65	kg/kg	0.220
FLTB095	fraction of total dry matter to leaves at DVS = 0.95	kg/kg	0
FLTB200	fraction of total dry matter to leaves at DVS = 2	kg/kg	0
FSTB000	fraction of total dry matter to stems at DVS = 0	kg/kg	0.318
FSTB015	fraction of total dry matter to stems at DVS = 0.15	kg/kg	0.450
FSTB025	fraction of total dry matter to stems at DVS = 0.25	kg/kg	0.377
FSTB050	fraction of total dry matter to stems at DVS = 0.50	kg/kg	0.690
FSTB065	fraction of total dry matter to stems at DVS = 0.65	kg/kg	0.780
FSTB095	fraction of total dry matter to stems at DVS = 0.95	kg/kg	0.270
FSTB200	fraction of total dry matter to stems at DVS = 2	kg/kg	0
FOTB000	fraction of total dry matter to storage at DVS = 0	kg/kg	0
FOTB095	fraction of total dry matter to storage at DVS = 0.95	kg/kg	0.73
FOTB200	fraction of total dry matter to storage at DVS = 2	kg/kg	1
Death rates			
PERDL	maximum relative death rate of leaves due to water stress	kg/kg/d	0.03
RDRRTB000	relative death rate of roots at DVS = 0	kg/kg/d	0
RDRRTB150	relative death rate of roots at DVS = 1.50	kg/kg/d	0

RDRRTB151	relative death rate of roots at DVS = 1.5001	kg/kg/d	0.02
RDRRTB200	relative death rate of roots at DVS = 2	kg/kg/d	0.02
RDRSTB000	relative death rate of stems at DVS = 0	kg/kg/d	0
RDRSTB150	relative death rate of stems at DVS = 1.50	kg/kg/d	0
RDRSTB151	relative death rate of stems at DVS = 1.5001	kg/kg/d	0.02
RDRSTB200	relative death rate of stems at DVS = 2	kg/kg/d	0.02
Water use			
CFET	correction factor transpiration rate	-	1.0
DEPNR	crop group number for soil water depletion	-	4.5
IAIRDU	air ducts in roots	-	0
Rooting			
RDI	initial rooting depth	cm	10
RRI	maximum daily increase in rooting depth	cm/d	1.2
RDMCR	maximum rooting depth	cm	125