

## List of CCROP Parameters Updated: 9-6-11

D=Driver, W=Water, P=Plant, N=Nutrient, O=Output

Parameter	Description	Units	Routine
A_SW_cm3	available substrate water content	cm <sup>3</sup>	W
A_SWavg_cm3	avg. available substrate water content	cm <sup>3</sup>	W
AEROCOMP	aerodynamic component for plant evaporation	cm	W
AEROCOMS	aerodynamic component for substrate evaporation	cm	W
AIRMASS	optical air mass		D
ALT	altitude	m	D
APPL	method of CRF application (SURF or INC)		N
AREA_RATIO	ratio of production area to pot area		D
AVG_PTA	average POT_TOTALAREA	cm <sup>2</sup>	D
AVGFD	average NFERTDAYS	day	D
AVGFD2	average NFERTDAYS2 for topdress	day	D
AVGTEMP	temperature mean up to current date	°C	D
AVGTEMP2	temperature mean for topdress up to current date	°C	D
BRAD	biased solar radiation through canopy		D
BTMEAN	biased temperature mean for photosynthesis	°C	D
CDR	clear day radiation	MJ/m <sup>2</sup>	D
CF_MAX	maximum irrigation enhancement factor		D,W
CF1,2	irrigation capture factor coefficients		D,W
CF_IRR	irrigation capture factor		D,W
CF_RAIN	rain capture factor		D,W
CHK_DAY1,2,3	DAY when size adjustments made		P
CHK_HT1,2,3	adjusted HT on check days	cm	P
CHK_W1,2,3	adjusted WIDTH on check days	cm	P
CINT	light interception extinction coefficient		P
CONT	controls daily loop		D
COSDEC	DAYLE parameter		D
COSF	DAYLE parameter		D
COSLAT	see COSF		D
CRF_DAYS	controlled-release fertilizer rating	day	N
CRF_DAYS2	controlled-release fertilizer rating for topdress CRF	day	N
CRF_N	controlled-release N in pot from initial application	g	N
CRF_N_BAL	running tally of CRF_N	g	N
CRF_N2	controlled-release N in pot from topdress	g	N
CRF_N2_BAL	running tally of CRF_N2	g	N
CRF_P	controlled-release P in pot from initial application	g	N
CRF_P_BAL	running tally of CRF_P	g	N
CRF_P_BAL2	running tally of CRF_P2	g	N
CRF_P2	controlled-release P in pot from topdress	g	N
CRF_TFAC	temperature factor for CRF release (21°C)		N
CROPEC	species-specific crop evaporation coefficient	MJ/kPa	P

CUMDRAIN_N	running tally of N in drainage	g	N
CUMDRAIN_P	running tally of P in drainage	g	N
CUMNRELEASE	running tally of N released from CRF	g	N
CUMNRELEASE2	running tally of N released from topdress CRF	g	N
CUMPRELEASE	running tally of P released from CRF	g	N
CUMPRELEASE2	running tally of P released from topdress CRF	g	N
CUMRUNOFF_N	running tally of N in runoff on pot basis	g	N
CUMRUNOFF_P	running tally of P in runoff on pot basis	g	N
CUMTHRU_N	irrigation N falling between containers	g	N
CUMTHRU_P	irrigation P falling between containers	g	N
CUT	reduction in height due to prune cut	cm	P
D_ IRR0	daily irrigation rate at start	cm	W
D_ IRR1	daily irrigation rate after 1 <sup>st</sup> change	cm	W
D_ IRR2	daily irrigation rate after 2 <sup>nd</sup> change	cm	W
D_ IRR3	daily irrigation rate after 3 <sup>rd</sup> change	cm	W
D_ IRR	daily irrigation rate at start	cm	W
d_LA	daily change in leaf area	cm <sup>2</sup>	P
d_PWSI	daily change in sink-limited biomass	g	P
d_PWSO	daily change in source-limited biomass	g	P
d_RW	daily change in sink-limited root dry wt.	g	P
d_TW	daily change top dry wt.	g	P
DATE	YRDOY format for controlling runs		D
DAY	days after planting		D
DELTA	ET function		W
DNCOEFF	coefficient for determining N release from CRF during downward part of the N release curve		N
DNCOEFF2	NDNCOEFF for topdress		N
DOY	day of year		D
DRAIN_cm	pot drainage	cm <sup>2</sup>	W
DRAIN_CUM_cm	running tally of drainage	cm	W
DRAIN_CUM_cm3	running tally of drainage	cm <sup>3</sup>	W
DRAIN_N	N content of pot drainage	g	N
DRAIN_NCONC	N conc in drainage water	g/cm <sup>3</sup>	N
DRAIN_P	P content of pot drainage	g	N
DRAIN_PCONC	P conc in drainage water	g/cm <sup>3</sup>	N
DRF	direct radiation fraction		D
DRPV	drain pore volume		W,N
DT	development time	day	D
DT_DELAY	delay accounting for transplant size		D
DT_Nmax	DT controlling rate of TW_No <sub>pt</sub> decrease		P
DT_Nmin	DT where TW_No <sub>pt</sub> is maximal		P
DT_Pmax	DT controlling rate of TW_Po <sub>pt</sub> decrease		P
DT_Pmin	DT where TW_Po <sub>pt</sub> is maximal		P
DT_PR	DT at pruning to control growth delay		P
DT1	DT corrected for actual LA	day	P

DTMAX	max temp for development	°C	D
DTMIN	min temp for development	°C	D
DOPTMAX	high optimum temp for development	°C	D
DOPTMIN	low optimum temp for development	°C	D
DTSLOPEmax	slope between DOPTMAX and DTMAX		D
DTSLOPEmin	slope between DTMIN and DOPTMIN		D
END_YR	year to end simulation		D
EP_cm3	actual plant evaporation	cm <sup>3</sup>	W
EPO	potential plant evaporation per pot	cm	W
EPO_cm3	potential plant evaporation per pot	cm <sup>3</sup>	W
EPO_MAD	max potential plant evaporation per pot	cm <sup>3</sup>	W
EPO_MAD_cm3	max potential plant evaporation per pot	cm <sup>3</sup>	W
ES_cm3	actual substrate evaporation per pot		W
ESCOR	earth sun distance correction for DAYLE		D
ESO	potential substrate evaporation	cm	W
ESO_cm3	potential substrate evaporation per pot	cm <sup>3</sup>	W
ET_cm	actual daily ET	cm	W
ET_cm3	actual daily ET per pot	cm <sup>3</sup>	W
ET_CUM_cm	running tally of ET on area basis	cm	W
ET_CUM_cm3	running tally of ET on volume basis	cm <sup>3</sup>	W
ETO	potential evapotranspiration	cm	W
ETO_cm3	potential evapotranspiration	cm <sup>3</sup>	W
ETR	extraterrestrial solar radiation	MJ/m <sup>2</sup>	D
FCDR	fractional clear day radiation		D
FERT	amount of fertilizer applied to container	g	N
FERT_N	amount of initial N applied to container	g	N
FERT_N2	amount of topdress N applied to container	g	N
FERT_P	amount of initial P applied to container	g	N
FERT_P2	amount of topdress P applied to container	g	N
FERT2	amount of topdress CRF	g	N
FERTDAYS	daily temperature adjustment of CRF_DAYS	day	N
FERTDAYS2	NFERTDAYS for topdress	day	N
FINALDAYS	days when 100% of N released from CRF	day	N
FINALDAYS2	NFINALDAYS for topdress	day	N
FINISH	finish simulation based on HARVDAY or SIZE		D
GAMMA	ET function		W
H2	empirical coefficient for optical air mass		D
H2O_NCONC	irrigation water N conc	ug/cm <sup>3</sup>	N
H2O_PCONC	irrigation water P conc	ug/cm <sup>3</sup>	N
HARV_HT	HT to terminate simulation	cm	D
HARVDAY	DAY to terminate simulation		D
HRANG	hour angle of the sun	radians	D
HT	average shoot height from substrate	cm	P
HTC1,2	height coefficients		P
IFNAME	irrigation file name .irr		D

IHT	initial height	cm	P
ILA	initial leaf area of transplant	cm <sup>2</sup>	P
IN_STATUS	initial N status of transplant “LOW, INPUT, OPT”		P
IOSTAT	for realtime irrigation scheduling		W
IRDOY	for realtime irrigation scheduling		W
IRR_NCONC	N concentration of irrigation water	mg/L	D
IRR_PCONC	P concentration of irrigation water	mg/L	D
IRR1, 2, 3	DAY to change fixed irrigation rate	day	D
IRRIG	daily irrigation read from weather file	cm	W
IRRIG_cm	daily irrigation “over container”	cm	W
IRRIG_cm3	daily irrigation “over” container	cm <sup>3</sup>	W
IRRIG_CUM_cm	running tally of irrigation	cm	W
IRRIG_CUM_cm3	running tally of irrigation	cm <sup>3</sup>	W
IRSTAT	for realtime irrigation scheduling		W
IRW_Kact	initial root K concentration	g/g	P
IRW_Nact	initial root N concentration	g/g	P
IRW_Pact	initial root P concentration	g/g	P
IRYR	for realtime irrigation scheduling		W
IS_FIRST	controls run		D
ITW_Kact	initial shoot K concentration	g/g	P
ITW_Nact	initial shoot N concentration	g/g	P
ITW_Pact	initial shoot P concentration	g/g	P
IW	initial width	cm	P
KINPUT	coefficient to bias solar effect on temp		D
LA	leaf area	cm <sup>2</sup>	P
LAI	leaf area index	cm <sup>2</sup> /cm <sup>2</sup>	P
LAT	site latitude		D
LATHEAT	latent heat of evaporation		W
LGC1,2	leaf growth coefficients for sink-limited growth		P
LGC3,4	leaf growth coefficients for relating biomass to leaf area		P
LGC5	coefficient for calculating DT1		P
LONG	site longitude		D
MAD	percent of available water to lose before irrigating		W
MAD_DIF	MAD deficit irrigation factor		W
MAD_SW_cm3	Substrate water content at MAD threshold	cm <sup>3</sup>	W
MAD_TF	MAD threshold factor		W
MOVE	space pots based on LAI or MOVE1,2,3		D
MOVE_LAI	threshold LAI for spacing containers	cm <sup>2</sup> /cm <sup>2</sup>	D
MOVE1,2,3	DAY of 1 <sup>st</sup> 2 <sup>nd</sup> , and 3 <sup>rd</sup> container spacing changes		D
N_PLT	N content of whole plant	g	P
N_ROOT	N content of roots	g	P
N_TOP	N content of tops	g	P
NCONC_MAX	maximum N concentration in drainage		N
NDEMAND	N demand by plant	g	P

NEXTIR	for realtime irrigation scheduling		W
NEXTSF	for solution fertilizer file schedule		N
NLF	N leach factor		N
NLOAD	runoff N on area basis	g/m <sup>2</sup>	N
NLOAD_CUM	running tally of NLOAD	g/m <sup>2</sup>	D
NOM	maximum number of moves when MOVE= LAI		D
NOP	number of prunes		P
NOPMAX	maximum number of prunes when PRUNE=TRIG		P
NRELEASE	N release rate of CRF	g/g	N
NRELEASE2	N release rate of topdress CRF	g/g	N
NSUF	N sufficiency factor for feedback suppression of plant growth (0-1)	g/g	P
NSUF_C1,2	coeff. used to relate shoot N conc status to NSUF		P
NSUF_TF	threshold factor for determining NSUF		P
NSUP_C1,2	nutrient supply root factor coefficients		N
NSUP_MAX1,2	coeff. relating NSUPPLY to container size		P
NSUP_RF	root factor for NSUPPLY		P
NSUPPLY	N available for plant uptake	g	N,P
NUPTAKE	amount of N taken up by plant	g	P
NUPTAKE_CUM	cumulative amount of N taken up by plant	g	P
OM	DAYLE parameter		D
OUT	dailyoutput file		O
OUTNLEACH	N leach output file		O
OUTNPLT	plant output file		O
OUTNREL	N release output file		O
OUTPLEACH	N leach output file		O
OUTPPLT	plant output file		O
OUTPREL	P release output file		O
OUTSUM	summary output file on pot basis		O
OUTSUMAREA	summary output file on area basis		O
OUTTEMP	temperature output file		O
P_PLT	P content of whole plant	g	P
P_ROOT	P content of roots	g	P
P_TOP	P content of tops	g	P
PARB	biased photosynthetically active radiation		D
PCONC_MAX	maximum P concentration in drainage		N
PCT_CRN	percent controlled-release N in fertilizer	%	N
PCT_CRN2	percent controlled-release N in topdress	%	N
PCT_K	percent K in fertilizer	%	N
PCT_K2	percent K in topdress fertilizer in	%	N
PCT_N	percent N in fertilizer	%	N
PCT_N2	percent N in topdress fertilizer	%	N
PCT_P	percent P in fertilizer	%	N
PCT_P2	percent P in topdress fertilizer	%	N
PDEMAND	P demand by plant	g	P

PEAKDAYS	days to peak N release rate	day	N
PEAKDAYS2	NPEAKDAYS for topdress	day	N
PEAKRATE	peak N release rate of CRF	g/g	N
PEAKRATE2	NPEAKRATE for topdress	g/g	N
PFNAME	plant file name .plt		D
PHOTOTEMP1, 2, 3	Coefficients for the effect of temp on development		D
PLF	P leach factor		N
PLOAD	runoff P on area basis	g/m <sup>2</sup>	N
PLOAD_CUM	running tally of PLOAD	g/m <sup>2</sup>	D
PLT_DATE	YRDOY to control finish of each season		D
PLT_DOY	DOY planted		D
PLT_YR	YR planted		D
POT_DRAIN_cm	drainage	cm	W
POT_DRAIN_cm3	drainage volume	cm <sup>3</sup>	W
POT_DRAIN1_cm3	drainage volume with ineffective rain	cm <sup>3</sup>	W
POT_DRAIN2_cm3	drainage volume with effective rain	cm <sup>3</sup>	W
POT_ET_cm	ET on pot basis	cm	W
POT_IRR_N	N contribution from irrigation water	g	N
POT_IRR_N_CUM	running tally of N from irrigation water	g	N
POT_IRR_P	P contribution from irrigation water	g	N
POT_IRR_P_CUM	running tally of P from irrigation water	g	N
POT_IRRIG_cm	irrigation water entering container	cm	W
POT_IRRIG_cm3	irrigation water entering container	cm <sup>3</sup>	W
POT_RAIN_cm	rain entering container	cm	W
POT_RAIN_cm3	rain entering container	cm <sup>3</sup>	W
POT_RAIN1_cm3	ineffective rain entering container	cm <sup>3</sup>	W
POT_RAIN2_cm3	effective rain entering container	cm <sup>3</sup>	W
POT_TOPAREA	top area of container	cm <sup>2</sup>	W
POTDIAM	pot diameter	cm	D
PR_DELAY	factor that slows growth after pruning		P
PR_H1,2,3	Prune height		P
PR_W1,2,3	Prune width		P
PR1,2,3	DAY pruned		P
PRELEASE	N release rate of CRF	g/g	N
PRELEASE2	N release rate of topdress CRF	g/g	N
PRESS	atmospheric pressure		W
PRHT_RED	prune height reduction		P
PRLAF1,2	factor for relating prune ht reduction to LA reduction		P
PRTWF1,2	factor for relating prune ht reduction to TW reduction		P
PRUNE	pruning schedule		P
PRUNE_N	N content of prunings	g	P
PRUNE_P	P content of prunings	g	P
PRUNE_TW	biomass of prunings	g	P

PSUF	P sufficiency factor for feedback suppression of plant growth (0-1)	g/g	P
PSUF_C1,2	coeff. used to relate shoot P conc status to PSUF		P
PSUF_TF	threshold factor for determining PSUF		P
PSUP_C1,2	PSUPPLY coefficients		N
PSUP_MAX1,2	coeff. relating PSUPPLY to container size		P
PSUP_RF	root factor for PSUPPLY		P
PSUPPLY	P available for plant uptake	g	N,P
PTA	pot total area – running value	cm <sup>3</sup>	W
PTA0	production area per container – initial value	cm <sup>2</sup>	W
PTA1	production area per container after 1 <sup>st</sup> move	cm <sup>2</sup>	W
PTA2	production area per container after 2 <sup>nd</sup> move	cm <sup>2</sup>	W
PTA3	production area per container after 3 <sup>rd</sup> move	cm <sup>2</sup>	W
PUPTAKE	amount of P taken up by plant	g	P
PUPTAKE_CUM	cumulative amount of P taken up by plant	g	P
PVLF	pore volume leach factor		N
R_OFF_NCONC	runoff N concentration	mg/L	N
R_OFF_PCONC	runoff P concentration	mg/L	N
RADCOM	radiation component of evaporation equations		W
RADCOM_CDR	radiation component for clear day condition		W
RAIN	rain from weather file	mm	W
RAIN_cm	rain	cm	D
RAIN_CUM_cm	running tally of rain on area basis	cm	W
RAIN_CUM_cm3	running tally of rain on pot basis	cm <sup>3</sup>	W
RAIN_EF	rain effectiveness factor		W
RAINCUT	when SCHED = FIXED, cutoff irrig when rain exceeds D_IRR (YES or NO)		W
RDT	relative development time or daily change in DT	day	D
RDTN1,2	relative development time parameters for describing low temp effect		D
RDTX1,2	relative development time parameters for describing high temp effect		D
REL_DAYS	day after CRF application		N
REL_DAYS2	day after topdress CRF application		N
RELEASERATE	fractional release of N from CRF	g/g	N
RELEASERATE2	fractional release of N from topdress CRF	g/g	N
RTPF	root partitioning factor		D,P
RUE	radiation use efficiency	g/MJ	P
RUN	identify simulation run		D
RUNOFF_cm	drainage plus un-intercepted water	cm	W
RUNOFF_cm3	drainage plus un-intercepted water per container	cm <sup>3</sup>	W
RUNOFF_CUM_cm	running tally of runoff per container	cm	W
RUNOFF_CUM_cm3	running tally of runoff per container	cm <sup>3</sup>	W
RUNOFF_N	N content of runoff	g	W
RUNOFF_P	P content of runoff	g	W

RUNOFF1_cm3	runoff from ineffective rain per container	cm <sup>3</sup>	W
RUNOFF2_cm3	runoff from effective rain per container	cm <sup>3</sup>	W
RW	root dry weight	g	P
RW_Nact	actual N conc of roots	g/g	P
RW_NoPt	optimum N conc of roots	g/g	P
RW_Pact	actual N conc of roots	g/g	P
RW_Popt	optimum N conc of roots	g/g	P
S_VOL	substrate volume	cm <sup>3</sup>	W
SCHED	irrigation schedule FIXED, MAD, or FILE		W
SF	solution fertilizer schedule		N
SF_DOY	solution fertilizer file schedule		N
SF_END	DAY to end solution fertilizer applications	day	N
SF_INT	time between solution fertilizer applications	day	N
SF_NCONC	solution fertilizer N concentration	ug/cm <sup>3</sup>	N
SF_PCONC	solution fertilizer P concentration	ug/cm <sup>3</sup>	N
SF_START	DAY to start solution fertilizer applications	day	N
SF_STAT	solution fertilizer file schedule		N
SF_TF	fraction of NDEMAND to calculate SF_UPFAC	g/g	N
SF_UPFAC	critical N level for triggering solution feed	g	N
SF_YR	solution fertilizer file schedule		N
SFFNAME	solution fertilizer input file name		N
SINDEC	DAYLE parameter		D
SINF	DAYLE parameter		D
SINLAT	see SINF		D
SIZE	size index (height+width)/2	cm	P
SLOPEN1,2	coeff. for relating DT with TW_NoPt		P
SLOPEP1,2	coeff. for relating DT with TW_Popt		P
SOLAR	solar radiation	MJ/m <sup>2</sup> /d	P
SPEC	management file designation		D
START_YR	year to start simulation		D
SUB_N	available N pool in substrate	g	N
SUB_NCONC	N concentration in substrate solution	g/cm <sup>3</sup>	N
SUB_P	available N pool in substrate	g	N
SUB_PCONC	N concentration in substrate solution	g/cm <sup>3</sup>	N
SW	volumetric water content of substrate	cm <sup>3</sup> /cm <sup>3</sup>	W
SW_cm	water content of substrate	cm	W
SW_cm3	water content per container	cm <sup>3</sup>	W
SW_DIF_cm3	substrate water content for MAD deficit irrigation	cm <sup>3</sup>	W
SW_TF	avail. substrate water threshold factor for WSUF	cm <sup>3</sup> /cm <sup>3</sup>	W
SWA_cm3	available water in container at container capacity	cm <sup>3</sup>	W
SWDUL	volumetric water content at container capacity	cm <sup>3</sup> /cm <sup>3</sup>	W
SWDUL_cm	water content of substrate at container capacity	cm	W
SWDUL_cm3	water content of substrate at container capacity	cm <sup>3</sup>	W
SWLL	volumetric water content of substrate at lower limit	cm <sup>3</sup> /cm <sup>3</sup>	W



SWLL_cm	water content of substrate at lower limit	cm	W
SWLL_cm3	water content of substrate at lower limit	cm <sup>3</sup>	W
SZC1,2	Size index coefficients		P
TARCD	clear day transmissivity of air		D
TBIAS	biased temperature mean using TMAXB		D
TC1	coefficient for CDR temperature bias on PARB		D
TD_DAY	date of topdress application		N
TD_TF	threshold factor – topdress is applied if N release is less than indicated percentage of N demand	%	N
TD_UPFAC	threshold N release – if N release is less than this value then a topdress application is indicated	g	N
TDAY	Temperature biased for daylight conditions		W
TDF	topdress application “FIXED,TRIG, or NONE”		N
TEMFACSO	temperature factor for determining photosynthetic rate during source-limited growth calculations		W
THETA	DAYLE parameter		D
THRU_cm	water falling between containers on area basis	cm	W
THRU_cm3	water falling between containers	cm <sup>3</sup>	W
THRU_CUM_cm	running tally of THRU_cm	cm	W
THRU_CUM_cm3	irrigation falling between containers	cm <sup>3</sup>	W
THRU_IRR_cm3	irrigation water falling between containers	cm <sup>3</sup>	W
THRU_N	N contribution of un-intercepted irrigation	g	W
THRU_P	P contribution of un-intercepted irrigation	g	W
TMAX	maximum daily air temperature	°C	D,P
TMAXB	biased temperature max due to radiation effect		D
TMEAN	mean daily air temperature	°C	D,N
TMIN	minimum daily air temperature	°C	D,P
TOTAL_IRRIG_cm3	irrigation water over area allotted to container	cm <sup>3</sup>	W
TOTAL_NOM	running total of NOM	g	D
TOTAL_RAIN_cm3	rain over area allotted to container	cm <sup>3</sup>	W
TP	total porosity	cm <sup>3</sup> /cm <sup>3</sup>	W
TP_cm3	total porosity volume	cm <sup>3</sup>	W,N
TPR	triggered prune height	cm	P
TPR1,2,3	triggered heights for 1 <sup>st</sup> , 2 <sup>nd</sup> , and 3 <sup>rd</sup> prunes	cm	P
TRELN	relative N sufficiency in tops		P
TRELP	relative P sufficiency in tops		P
TW	top dry weight	g	P
TW_Nact	actual N conc of tops	g/g	P
TW_Nmin	minimum shoot N conc for TRELN	g/g	P
TW_Nopt	optimum N conc of tops	g/g	P
TW_Noptmax	maximum N conc of tops	g/g	P
TW_Noptmin	minimum N conc of tops	g/g	P
TW_Pact	actual P conc of tops	g/g	P
TW_Pmin	minimum shoot P conc for TRELP	g/g	P
TW_Popt	optimum P conc of tops	g/g	P

TW_Poptmax	maximum P conc of tops	g/g	P
TW_Poptmin	minimum P conc of tops	g/g	P
UPCOEFF	coefficient for determining N release from CRF during upward part of the N release curve		N
UPCOEFF2	NUPCOEFF for topdress		N
VP	vapor pressure	kPa	N
VPD	vapor pressure deficit		W
VPLT	volume of plant	cm <sup>3</sup>	D
WDC1, 2	width coefficients		P
WFNAME	weather file name .wth		W
WIDTH	average shoot width	cm	P
WSUF	water sufficiency factor for plant growth (0-1)		W,P
Y_RAIN_cm	yesterday's rain	cm	W
Y_TW	yesterday's shoot weight	g	P
YR	year		D