*This text was copied and modified from the Century 4.0 User’s Manual*

**Appendix 2.1. Century 4.7 crop parameters (crop.100)**

The crop.100 file will contain these parameters for each option:

Crop options file "crop.100" will contain these values:

prdx(1) potential aboveground monthly production scalar for crops (usually 0.1 to 4.0), the relative genetic potential for growth (Note: the definition of this parameter has changed since Century 4.0)

ppdf(1) optimum temperature for production for parameterization of a Poisson Density Function curve to simulate temperature effect on growth

ppdf(2) maximum temperature for production for parameterization of a Poisson Density Function curve to simulate temperature effect on growth

ppdf(3) left curve shape for parameterization of a Poisson Density Function curve to simulate temperature effect on growth

ppdf(4) right curve shape for parameterization of a Poisson Density Function curve to simulate temperature effect on growth

bioflg flag indicating whether production should be reduced by physical obstruction

= 0 production should not be reduced = 1 production should be reduced

biok5 level of aboveground standing dead + 10% strucc(1) C at which production is reduced to half maximum due to physical obstruction by dead material (g/m2)

pltmrf planting month reduction factor to limit seedling growth; set to 1.0 for grass

fulcan value of aglivc at full canopy cover, above which potential production is not reduced

frtcindx **0** - use Great Plains equation to compute root to shoot ratio (fixed carbon allocation based on rainfall, perennial plant); **1** - perennial plant; **2** - annual plant; **3** - perennial plant, growing degree day; **4** - non-grain filling annual plant, growing degree day implementation; **5** - grain filling annual plant, growing degree day implementation; **6** - grain filling annual plant that requires a vernalization period (i.e. winter wheat), growing degree day implementation

frtc(1) fraction of C allocated to roots at planting, with no water or nutrient stress, used when FRTCINDX = 2, 4, 5, or 6 (annual plants)

frtc(2) fraction of C allocated to roots at time FRTC(3), with no water or nutrient stress, used when FRTCINDX = 2, 4, 5, or 6 (annual plants)

frtc(3) time after planting (months with soil temperature greater than RTDTMP) at which the FRTC(2) value is reached, used when FRTCINDX = 2,4,5, or 6 (annual plants)

frtc(4) maximum increase in the fraction of C going to the roots due to water stress, used when FRTCINDX = 2, 4, 5, or 6 (annual plants)

frtc(5) maximum increase in the fraction of C going to the roots due to nutrient stress, used when FRTCINDX = 2, 4, 5, or 6 (annual plants)

cfrtcn(1) maximum fraction of C allocated to roots under maximum nutrient stress, used when FRTCINDX = 1 or 3 (perennial plants)

cfrtcn(2) minimum fraction of C allocated to roots with no nutrient stress, used when FRTCINDX = 1 or 3 (perennial plants)

cfrtcw(1) maximum fraction of C allocated to roots under maximum water stress, used when FRTCINDX = 1 or 3 (perennial plants)

cfrtcw(2) minimum fraction of C allocated to roots with no water stress, used when FRTCINDX = 1 or 3 (perennial plants)

biomax biomass level (g biomass/m2) above which the minimum and maximum C/E ratios of new shoot increments equal pramn(\*,2) and pramx(\*,2) respectively

pramn(3,1) minimum C/E ratio with zero biomass

(1,1) = N (2,1) = P (3,1) = S

pramn(3,2) minimum C/E ratio with biomass greater than or equal to biomax

(1,2) = N (2,2) = P (3,2) = S

pramx(3,1) maximum C/E ratio with zero biomass

(1,1) = N (2,1) = P (3,1) = S

pramx(3,2) maximum C/E ratio with biomass greater than or equal to biomax

(1,2) = N (2,2) = P (3,2) = S

prbmn(3,2) parameters for computing minimum C/N ratio for belowground matter as a linear function of annual precipitation

(1,1) = N, intercept (2,1) = P, intercept (3,1) = S, intercept

(1,2) = N, slope (2,2) = P, slope (3,2) = S, slope

prbmx(3,2) parameters for computing maximum C/N ratio for belowground matter as a linear function of annual precipitation

(1,1) = N, intercept (2,1) = P, intercept (3,1) = S, intercept

(1,2) = N, slope (2,2) = P, slope (3,2) = S, slope

fligni(1,1) intercept for equation to predict lignin content fraction based on annual rainfall for aboveground material

fligni(2,1) slope for equation to predict lignin content fraction based on annual rainfall for aboveground material. For crops, set to 0.

fligni(1,2) intercept for equation to predict lignin content fraction based on annual rainfall for belowground material

fligni(2,2) slope for equation to predict lignin content fraction based on annual rainfall for belowground material. For crops, set to 0.

himax harvest index maximum (fraction of aboveground live C in grain)

hiwsf harvest index water stress factor

= 0 no effect of water stress

= 1 no grain yield with maximum water stress

himon(1) number of months prior to harvest in which to begin accumulating water stress effect on harvest index

himon(2) number of months prior to harvest in which to stop accumulating water stress effect on harvest index

efrgrn(3) fraction of the aboveground E which goes to grain

(1) = N (2) = P (3) = S

vlossp fraction of aboveground plant N which is volatilized (occurs only at harvest)

fsdeth(1) maximum shoot death rate at very dry soil conditions (fraction/month); for getting the monthly shoot death rate, this fraction is multiplied times a reduction factor depending on the soil water status

fsdeth(2) fraction of shoots which die during senescence month; must be greater than or equal to 0.4

fsdeth(3) additional fraction of shoots which die when aboveground live C is greater than fsdeth(4)

fsdeth(4) the level of aboveground C above which shading occurs and shoot senescence increases

fallrt fall rate (fraction of standing dead which falls each month)

rdr maximum root death rate at very dry soil conditions (fraction/month); for getting the monthly root death rate, this fraction is multiplied times a reduction factor depending on the soil water status

rtdtmp physiological shutdown temperature for root death and change in shoot/root ratio

crprtf(3) fraction of E retranslocated from grass/crop leaves at death

(1) = N (2) = P (3) = S

snfxmx(1) symbiotic N fixation maximum for grass/crop (Gn fixed/Gc new growth)

del13c delta 13C value for stable isotope labeling

co2ipr(1) in a grass/crop system, the effect on plant production ratio of doubling the atmospheric CO2 concentration from 350 ppm to 700 ppm

co2itr(1) in a grass/crop system, the effect on transpiration rate of doubling the atmospheric CO2 concentration from 350 ppm to 700 ppm

co2ice(1,2,3) in a grass/crop system, the effect on C/E ratios of doubling the atmospheric CO2 concentration from 350 ppm to 700 ppm

(1,1,1) = minimum C/N (1,2,1) = maximum C/N

(1,1,2) = minimum C/P (1,2,2) = maximum C/P

(1,1,3) = minimum C/S (1,2,3) = maximum C/S

co2irs(1) in a grass/crop system, the effect on root‑shoot ratio of doubling the atmospheric CO2 concentration from 350 ppm to 700 ppm

***crop.100 parameters below were added since Century 4.0 (frtcindx, frtc(4), frtc(5), cfrtcn(1), cfrtcn(1), cfrtcn(1), and cfrtcn(1) above were also added since Century 4.0).***

KMRSP(1) - fraction of net primary production that goes to the maintenance respiration storage pool for crops

CKMRSPMX(1) - maximum fraction of aboveground live C that goes to maintenance respiration for crops (0.0 – 1.0).

CKMRSPMX(2) - maximum fraction of belowground root C that goes to maintenance respiration for crops (0.0 – 1.0).

NO3PREF(1) - maximum fraction of plant N uptake from NO3-N. The remaining N uptake comes from NH4-N. Currently this parameter is not used.

CLAYPG - number of soil layers used to determine water and mineral N, P, and S that are available for grass/crop growth. This value shoule not exceed NLAYER in the <site>.100 file.

CMIX - rate of mixing of surface SOM2C and soil SOM2C for grass/crop system, this value will also be used when running a savanna

TMPGERM - germination temperature for the growing degree day submodel, will cause a FRST event when FRTCINDX = 3 or a PLTM event when FRTCINDX = 4 (°C)

DDBASE - number of degree days required to trigger a senescence (SENM) event for a perennial (FRTCINDX = 3), maturity and harvest (HARV) for a non-grain filling annual (FRTCINDX = 4), or to reach anthesis (flowering) for a grain filling annual (FRTCINDX = 5 or 6)

TMPKILL - temperature at which growth will stop when using the growing degree day submodel, will cause a SENM and LASTevent when FRTCINDX = 3 or a HARV and LAST event ifFRTCINDX = 4, 5, or 6, if the required number of thermal units have not been accumulated prior to trigger a SENM or a HARV event (°C)

BASETEMP - base temperature for crop growth, growing degree days will accumulate only on day when the average temperature is greater than the base temperature for the crop (°C)

MNDDHRV - minimum number of degree days from anthesis (flowering) to harvest for grain filling annuals (FRTCINDX = 5 or 6)

MXDDHRV - maximum number of degree days from anthesis (flowering) to harvest for grain filling annuals (FRTCINDX = 5 or 6)