Table 12.11 plants.in – Crop parameters

Note: In contrast to the information provided in file selector.in, which are unit free, the crop parameters provided in plants.in are given in a specific unit!

Record	Type	Symbol	Description
1			Comment line
2.1.	Integer	*version*	Version number of crop input.
3			Comment line
4.1.	logical	*CO2_fluxes*	**.true.** enables writing output file 'co2_fluxes.out', contains information on plant related carbon fluxes.
4.2	logical	*Respiration*	**.true.** enables writing output file 'respiration.out', contains information on respiratory carbon fluxes.
4.3	logical	*Maint_growth*	**.true.** enables writing output file 'maint_growth.out', contains information on organ-specific maintenance and growth respiration.
4.4	integer	*waterstress*	**.true.** enables crop water stress according to Feddes approach based on pressure head, **.false.** switches water stress off. Integer numbers can also be used: **0**=no stress **1**=stress according to Feddes pressure head **2**=stress according to Feddes water content **3**=stress according to Couvreur
4.5	logical	*rootExudation*	**.true.** enables carbon exudation from roots
4.6	logical	*rootDeath*	**.true.** enables dying of a root fraction in the growing season
4.7	logical	*harvestResidues*	**.true.** enables incorporation of aboveground and belowground crop residues after harvest for C, N and P, aboveground residues are equally distributed over soil depth down to ploughing depth (Block H, rec. 8.5)
4.8	logical	*farquhar*	**.true.** enables the estimation of photosynthesis according to Farquhar et al. and writing output file 'sif.out'. When set to **.true.** records 47, 48.1 and 49.1 are required. **.false.** switches the original empirical SUCROS approach on. Note: When set to **.false.** records 47, 48.1 and 49.1 have to be omitted
4.9.	Integer	*P_uptake_method*	Switch to select the method to compute the phosphorus root uptake demand: **1**= DVS against fraction of P in plant; Table 18 provided **2**=APEX-EPIC method; parameters bp1, bp2 and bp3 in records 50 to 51 provided

			Note: this switch is only required when *Phosphorus*=**.true.** (rec 6.9, Block A in selector in)
5.1.	logical	*daily*	Set **.true.** for daily time steps. **.false.** indicates hourly time step. Make sure this is consistent with rec. 5.2, Block A in 'selector.in'
6.1.	integer	*StartDate*	start date of the simulation [yyyy mm dd], this is the date of the first time step in 'atmosph.in'
7.1.	integer	*NoSucrosTypes*	Number of SUCROS plant types in input; provide records 12.1 to 46.1 (49.1 for farquhar=**.true.**) for each plant type
8.1.	integer		Length unit in 'selector.in', (rec. 5.1): **1**=mm **2**=cm **3**=dm **4**=m **5**=km
9.1.	integer	*InterceptModel*	Model for rainfall interception: **1**=Rutter (for hourly or daily time steps) **2**=Hoyningen-Huene (daily time steps only)
10.1.	real	*Latitude*	Geographical latitude of the site [°] in decimal degrees
11			Comment line
12.1.	Integer	*Type*	SUCROS plant type: **1**=Winter Wheat **2**= Summer Wheat **3**= Maize **4**=Potatoe **5**=Sugar Beet **6**=Grassland (C3 Grass) **12**=Winter Rye **13**= Grassland (C4 Grass)
13.1.-x	Integer	*Nrows*	Number of rows in the 12 or 17 tables, all on one input line.
14.1.	Integer	*No_dates*	Number of dates for emergence and harvest. Set to 1 for one pair of emergence and harvest. Note: For grassland (type=6 or 13) various cutting event in one year can be specified, eg. no_dates=4 indicates one emergence date and 3 cutting dates, all on one line.
15.1.	Integer	*lbuffer*	Number of SUCROS parameters, currently 50
16.1.	Integer	*akctype*	A_{Kc} calculation against: **1**=DVS **2**=time **3**= A_{Kc} calculated internally in dependence of LAI_g, the minimum A_{Kc} is read from Tab. 11, $K_{c,sca}$ is read as maximum of Tab. 11 **4**= A_{Kc} calculated internally in dependence of LAI_g, the minimum A_{Kc} is read from Tab. 11, LAI_{unity} is read as maximum of Tab. 11

17.1.	Integer	*tstart*	Start time for senescence [DOY] (day of year, i.e. Julian Date)
17.2.	Integer	*tend*	End time for senescence [DOY] (day of year, i.e. Julian Date)
17.3.	real	*Temp_senesc*	Required for crop **4** (potatoe) only. Start temperature sum for senescence [°C*day]
18.1.	real	*p0*	waterstress=1 pressure head is given [mm], waterstress=2 water content is given [-], waterstress=3 this is HX_{min} [mm]
18.2.	real	*p1*	waterstress=1 pressure head is given [mm], waterstress=2 water content is given [-], waterstress=3 this is K_{RS} [T^{-1}]
18.3.	real	*p2h*	waterstress=1 pressure head is given [mm], waterstress=2 water content is given [-], waterstress=3 this is K_{COMP} [T^{-1}]
18.4.	real	*p2l*	waterstress=1 pressure head is given [mm], waterstress=2 water content is given [-], waterstress=3 not required
18.5.	real	*p3*	waterstress=1 pressure head is given [mm], waterstress=2 water content is given [-], waterstress=3 not required
19.1.	integer	*lCeres*	CERES switch for wheat phonology, 1=CERES 0=SUCROS (original approach)
19.2.	real		CERES temperature [°C]
19.3.	real		CERES temperature [°C]
19.4.	real		CERES temperature [°C]
19.5.	real		CERES temperature [°C]
19.6.	real		CERES temperature [°C]
19.7.	real		CERES temperature [°C]
19.8.	real		CERES temperature [°C]
19.9.	real		CERES temperature [°C]
19.10.	real		CERES temperature [°C]
19.11.	real		CERES temperature [°C]
19.12.	real		CERES temperature [°C]
19.13.	real		CERES temperature [°C]
20.1.	real		CERES photoperiod P_{opt}
20.2.	real		CERES photoperiod P_{crit} [h]
20.3.	real		CERES photoperiod omega [h^{-1}]
21.1.	real		CERES maximum development rate
21.2.	real		CERES maximum development rate
21.3.	real		CERES maximum development rate [h^{-1}]
22.1.	real	*RNA_MAX*	maximum depth of root system [mm] (negative value), above there is no root water uptake
23.1.	real	*ROOT_MAX*	maximum rooting depth [mm]
24.1.	real	*ROOT_INIT*	initial rooting depth [mm]
25.1.	real	*EXU_FACT*	Root carbon exudation factor [-]
26.1.	real	*DEATHFACMAX*	Maximum fraction of root death [-] in one season, factor used for deathfac
27.1.	integer	*NSL*	number of seedlings per m^2 [plants/m^2]

28.1.	real	*RGR*	relative growth rate during exponential leaf area growth [ha/ha/°C/d]
29.1.	real	*TEMPBASE*	base temperature for juvenile leaf area growth [°C]
30.1.	real	*SLA*	specific leaf area of new leaves [ha leaf/kg DM]
31.1.	real	*RSLA*	change of specific leaf area per unit thermal time [ha leaf/kg DM/°C/d]
32.1.	real	*AMX*	potential CO_2-assimilation rate of a unit leaf area for light saturation [kg CO_2/ha leaf/h], (internally converted from ha to the units of selector.in [L^2] in AgroC)
33.1.	real	*EFF*	initial light use efficiency [(kg CO_2/ha leaf/h)/(J/m^2/s)], (internally converted from ha to the units of selector.in [L^2] in AgroC)
34.1.	real	*RKDF*	extinction coefficient for diffuse PAR flux [-]
35.1.	real	*SCP*	scattering coefficient of leaves for PAR [-]
36.1.	real	*RMAINSO*	maintenance demand rate for storage organs per unit dry matter [kg CH_2O/kg DM/d]
37.1.	real	*ASRQSO*	conversion efficiency coefficient (assimilation requirement of dry matter for storage organs) [kg CH_2O/kg DM]
38.1.	real	*TEMPSTART*	start temperature for plant growth [°C*day] (for crop 1: temp_sum from emergence until 31. Dec + tempstart for spring growth)
39.1.	real	*DEBR_FAC*	dead LAI debris factor [-]
40.1.	real	*LS*	Leaf area index as switch from temperature to radiation-limited leaf area index expansion [ha/ha]
41.1.	real	*RLAICR*	critical leaf area index for leaf death due to self-shading [ha/ha]
42.1.	real	*EAI*	initial value of the ear area index (two-sided), relevant for crops 1, 2, 3 and 5
43.1.	real	*RMATR*	initial value of the maturity class, relevant only for crop 4
44.1.	real	*SSL*	leaf area of one seedling [m^2 leaf/seedling]
45.1.	real	*SRW*	specific root weight [m/g]
46.1.	real	*SLAID_OFF*	dead leaf area index out of season [ha/ha]
47			Comment line; Note: should only be present in input when farquhar=**.true.** (rec. 4.8). This comment line must contain '#farquhar'.
48.1.	real	*Vcmax25n*	Maximum rate of carboxylation [µmol CO_2 m^{-2} s^{-1}] at 25°C and for optimum N supply. Note: rec. 48.1 should only be present in input when farquhar=**.true.** (rec. 4.8)
49.1.	real	*m*	*m* [-] is the Ball-Berry slope parameter (Collatz et al., 1991). Note: rec. 49.1 should only be present in input when farquhar=**.true.** (rec. 4.8)
50.x		*Comment line*	This line must contain '#phosphorus' for P_uptake_method=**2**

51.1-3.x	real	*bp1, bp2 bp3*	Parameters for the APEX-EPIC method to compute P uptake demand [kg P kg DM^{-1}]. Note: records 50 and 51 must only be provided this way, when P_uptake_method=**2**
50			Comment line
51.1.-3.	integer	*Emergence*	Emergence date [YYYY MM DD]
51.4.-6.	integer	*Harvest*	Harvest date [YYYY MM DD], on one line with emergence date, provide 1 to *No_dates* (rec. 14.1) lines
52			Comment line
53.1-2.	Real	*Tab1*	**Table 1**, relevant to crops **1**, **2**, **3** and **5**, for crop **1**, **2** and **3** DVS against reduction factor of the maximal light assimilation rate [-], for crop **5** temperature sum [°C*day] against reduction factor of the maximal light assimilation rate [-]
54			Comment line
55.1-2.	Real	*Tab2*	**Table 2**, effective temperature [°C] against reduction factor of the maximal light assimilation rate [-]
56			Comment line
57.1-2.	Real	*Tab3*	**Table 3**, effective temperature [°C] against reduction factor of the development rate [-] for DVS < 1.0, relevant to crops **1**, **2** and **3**
58			Comment line
59.1-2.	Real	*Tab4*	**Table 4**, effective temperature [°C] against reduction factor of the development rate [-] for DVS > 1.0, relevant to crops **1**, **2** and **3**
60			Comment line
61.1-2.	Real	*Tab5*	**Table 5**, DVS [-] against fraction of dry matter allocated to the shoot [-], relevant to crops **1**, **2**, **3** and **5**
62			Comment line
63.1-2.	Real	*Tab6*	**Table 6**, temperature sum [°C*day] against fraction of dry matter allocated to the leaves [-], relevant to crops **1**, **2**, **3** and **5**
64			Comment line
65.1-2.	Real	*Tab7*	**Table 7**, temperature sum [°C*day] against fraction of dry matter allocated to the stems [-], relevant to crops **1**, **2**, **3** and **5**
66			Comment line
67.1-2.	Real	*Tab8*	**Table 8**, temperature sum [°C*day] against: for crop **3** this the fraction of dry matter allocated to the cob [-] (FCOBT), for crop **5** this is the fraction of dry matter allocated to the root [-] (FRT)
68			Comment line
69.1-2.	Real	*Tab9*	**Table 9**, DVS [-] against: for crop **1** this is the death rate of leaves reduction function [-], for crop **3** this is the specific leaf area index [ha leaf/kg DM] as a function of development stage

70			Comment line
71.1-2.	Real	*Tab10*	**Table 10**, for crops **1** and **2**: effective temperature [°C] against death rate of leaves [1/day]; for crop **5**: temperature sum [°C*day] against relative death rate of leaves [-]
72			Comment line
73.1-2.	Real	*Tab11*	**Table 11**, DVS [-] or time [DOY] (day of year, i.e. Julian Date) against A_{kc} [-], depends on *akctype* (rec. 16.1) setting
74			Comment line
75.1-2.	Real	*Tab12*	**Table 12**, relative root depth [-] against root density [-]
76			Comment line
77.1-2.	Real	*Tab13*	**Table 13**, DVS [-] against N content of leaves XNCLE [kg N/kg DM], required only for *nitrogen*=**.true.** (rec. 6.8., Block A, selector.in)
78			Comment line
79.1-2.	Real	*Tab14*	**Table 14**, DVS [-] against N content of stems XNCST [kg N/kg DM], required only for *nitrogen*=**.true.** (rec. 6.8., Block A, selector.in)
80			Comment line
81.1-2.	Real	*Tab15*	**Table 15**, DVS [-] against N content of roots XNCRT [kg N/kg DM], required only for *nitrogen*=**.true.** (rec. 6.8., Block A, selector.in)
82			Comment line
83.1-2.	Real	*Tab16*	**Table 16**, DVS [-] against N content of storage organs XNCSO [kg N/kg DM], required only for *nitrogen*=**.true.** (rec. 6.8., Block A, selector.in)
84			Comment line
85.1-2.	Real	*Tab17*	**Table 17**, DVS [-] against N content of crowns XNCCRN [kg N/kg DM], required only for *nitrogen*=**.true.** (rec. 6.8., Block A, selector.in), used for crop **5** only
86			Comment line
87.1.-2.	Real	*Tab18*	**Table 18**, DVS [-] against P content of the entire plant [kg P/kg DM], required only for *phosphorus*=**.true.** (rec. 6.9., Block A, selector.in) and P_uptake_method=**1**

File plants.in need not supplied if logical variable *Plants* (rec. 6.7. in Block A, selector.in) is set equal to **.false.**.