

Appendix 1: SimRoot Parametrization

SimRoot uses a hierarchical input file which is summarized below. The hierarchy gives the parameters context. For example, the parameter 'specific leaf area' belongs to the shoot of a specific plant. In *SimRoot*, parameters can be a single value, a value drawn from a distribution (random), or the result of an interpolation table. For constants we give the value, for distributions the distribution parameters and for the tables a list of space separated values e.g. x1 y1 x2 y2 xn yn.

1. 'environment'

1.1. 'atmosphere'

1.1.1 'evaporation' (cm)=f{'time'} (day) x,y pairs :{ 0 0 1 0.05 2 0.1 3 0.1 4 0.05 5 0.05 6 0.1 7 0.05 8 0.05 9 0.1 10 0.1 11 0.05 12 0.1 13 0.1 14 0.05 15 0.04 16 0.03 17 0.02 18 0.09 19 0.09 20 0.04 21 0.09 22 0.09 23 0.04 24 0.03 25 0.02 26 0.02 27 0.08 28 0.03 29 0.08 30 0.03 31 0.08 32 0.07 33 0.07 34 0.07 35 0.03 36 0.02 37 0.01 38 0 39 0 40 0 41 0 42 0.06 }

1.1.2 'irradiation' = 4000 (umol cm⁻² day⁻¹)

1.1.3 'precipitation' (cm)=f{'time'} (day) x,y pairs :{ 0 0 1 0 2 1 3 0.29 4 0 5 0 6 0.61 7 0 8 0 9 0.25 10 0.03 11 0 12 0.64 13 0.33 14 0 15 0 16 0 17 0 18 1.8 19 0.2 20 0 21 2.84 22 0.38 23 0 24 0 25 0 26 0 27 0.18 28 0 29 0.46 30 0 31 1.35 32 0.13 33 0.23 34 0.25 35 0 36 0 37 0 38 0 39 0 40 0 41 0 42 1.42 }

1.2. 'dimensions'

1.2.1 'max corner' = 13 0 30 (cm)

1.2.2 'min corner' = -13 -150 -30 (cm)

1.3. 'soil'

1.3.1 'bulk density' (g cm⁻³)=f{'depth'} (cm) x,y pairs :{ -200 1.51 -65 1.51 -47 1.4 -30 1.42 -16 1.29 -5 1.24 0 1.24 }

1.3.2 'nitrate'

1.3.2.1 'adsorption coefficient' = 0 (umol cm⁻¹)

1.3.2.2 'concentration' (umol ml⁻¹)=f{'depth'} (cm) x,y pairs :{ -1000 1.59 -55 1.59 -45 1.67 -35 2.17 -25 3.15 -15 4.02 -5 2.36 0 2.8 0.01 0 100 0 }

1.3.2.3 'longitudinal dispersivity' = 1 (cm)

1.3.2.4 'saturated diffusion coefficient' = 1.6416 (cm² day⁻¹)

1.3.2.5 'transverse dispersivity' = 0.5 (cm)

1.3.3 'organic'

1.3.3.1 'CNRatio microbes' = 10 (g g⁻¹)

1.3.3.2 'CNratio' (g g⁻¹)=f{'depth'} (cm) x,y pairs :{ -10000 13 0 13 }

1.3.3.3 'assimilation efficiency microbes' = 1 ()

- 1.3.3.4 'carbon content' (g g^{-1})= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -200 0.005 -40 0.005 -30 0.01 -10 0.02 0 0.02 }
- 1.3.3.5 'initial relative mineralisation rate' ($\text{g g}^{-1} \text{ year}^{-1}$)= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -1000 0 -25 0 -10 0.037 0 0.037 }
- 1.3.3.6 'speed of aging' = 0.46 ()
- 1.3.3.7 'time offset' = 30 (day)
- 1.3.4 'phosphorus'
 - 1.3.4.1 'buffer power' ()= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -1000 400 1000 400 }
 - 1.3.4.2 'concentration' (umol ml^{-1})= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -1000 0.00024 -30 0.00025 -29 0.00175 0 0.00175 0.0001 0 1000 0 }
 - 1.3.4.3 'diffusion coefficient' ($\text{cm}^2 \text{ day}^{-1}$)= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -1000 0.00019872 1000 0.00019872 }
- 1.3.5 'potassium'
 - 1.3.5.1 'adsorption coefficient' = 33.3 (umol cm^{-1})
 - 1.3.5.2 'concentration' (umol ml^{-1})= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -1000 0.05 -30 0.05 -29 0.15 0 0.15 1e-05 0 1000 0 }
 - 1.3.5.3 'longitudinal dispersivity' = 1 (cm)
 - 1.3.5.4 'saturated diffusion coefficient' = 1.56 ($\text{cm}^2 \text{ day}^{-1}$)
 - 1.3.5.5 'transverse dispersivity' = 0.5 (cm)
- 1.3.6 'water'
 - 1.3.6.1 'initial hydraulic head' (cm)= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -200 0 -151 -50 -50 -150 -45 -155 -40 -160 -35 -165 -30 -170 -25 -175 -20 -180 -15 -190 -10 -200 -5 -220 -2 -240 -1 -300 -0 -400 }
 - 1.3.6.2 'residual water content' (100%)= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -300 0.067 0 0.067 }
 - 1.3.6.3 'saturated conductivity' (cm day^{-1})= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -300 10.8 0 10.8 }
 - 1.3.6.4 'saturated water content' (100%)= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -300 0.39 -65 0.39 -35 0.39 -25 0.43 -15 0.45 0 0.46 }
 - 1.3.6.5 'van genuchten:alpha' (cm^{-1})= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -300 0.02 0 0.02 }
 - 1.3.6.6 'van genuchten:n' ()= $f\{\text{'depth'}\}$ (cm) x,y pairs :{ -300 1.41 0 1.41 }
- 2. 'maize parameters'
 - 2.1. 'braceroots'
 - 2.1.1 'aerenchyma formation' (100%)= $f\{\text{'time since creation'}\}$ (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.1.2 'bottom boundary' = 1 ()
 - 2.1.3 'bounce of the side' = 1 ()
 - 2.1.4 'branch list'
 - 2.1.4.1 'lateral of crown roots'
 - 'allow branches to form above ground' = 0 () 'branching frequency'(cm)= $f\{\text{'normal distribution'}\}$ minimum=0.01 maximum=2 mean=0.5 stdev=1e-05 'branching spatial offset' = 12 (cm) 'length root tip' = 10.93 (cm) 'number of branches/whorl' = 1 (#)
 - 2.1.5 'branching angle' = 140 (degrees)

- 2.1.6 'cannot grow up' = 1 ()
- 2.1.7 'density' = 0.094 (g cm⁻³)
- 2.1.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.4 8 0.4 15 0.15 24 0.1 100 0.1 }
- 2.1.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
- 2.1.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 5 1 10 4.5 17 4.5 22 0 1000 0 }
- 2.1.11 'length root tip without xylem vessels' = 2 (cm)
- 2.1.12 'longitudinal growth rate multiplier'(cm)=f{'uniform distribution'} minimum=0.7 maximum=1
- 2.1.13 'nitrate'
 - 2.1.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.1.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.1.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.1.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.1.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.1.14 'number of xylem poles' = 40 ()
- 2.1.15 'phosphorus'
 - 2.1.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.1.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.1.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.1.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.1.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.1.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.1.16 'potassium'
 - 2.1.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.1.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.1.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.1.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.1.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.1.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.1.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.1.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.1.19 'regular topology' = 4 ()
- 2.1.20 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.1.21 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.1.22 'root class ID' = 102 ()
- 2.1.23 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }

- 2.1.24 'root hair diameter' = 0.0005 (cm)
- 2.1.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.1.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.03 maximum=0.03
- 2.1.27 'top boundary' = 1 ()
- 2.2. 'braceroots 2'
 - 2.2.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.2.2 'bottom boundary' = 1 ()
 - 2.2.3 'bounce of the side' = 1 ()
 - 2.2.4 'branch list'
 - 2.2.5 'branching angle' = 130 (degrees)
 - 2.2.6 'cannot grow up' = 1 ()
 - 2.2.7 'density' = 0.094 (g cm⁻³)
 - 2.2.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.5 9 0.5 16 0.2 24 0.1 100 0.1 }
 - 2.2.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
 - 2.2.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 5 1 10 4.5 17 4.5 22 0 1000 0 }
 - 2.2.11 'length root tip without xylem vessels' = 2 (cm)
 - 2.2.12 'longitudinal growth rate multiplier'(cm)=f{'uniform distribution'} minimum=0.7 maximum=1
 - 2.2.13 'nitrate'
 - 2.2.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.2.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.2.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.2.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.2.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
 - 2.2.14 'number of xylem poles' = 48 ()
 - 2.2.15 'phosphorus'
 - 2.2.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.2.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.2.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.2.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.2.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.2.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
 - 2.2.16 'potassium'
 - 2.2.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.2.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.2.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.2.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.2.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.2.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)

- 2.2.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.2.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.2.19 'regular topology' = 3 ()
- 2.2.20 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.2.21 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.2.22 'root class ID' = 102 ()
- 2.2.23 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.2.24 'root hair diameter' = 0.0005 (cm)
- 2.2.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.2.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.03 maximum=0.03
- 2.2.27 'top boundary' = 1 ()
- 2.3. 'finelateral'
- 2.3.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
- 2.3.2 'bottom boundary' = 1 ()
- 2.3.3 'bounce of the side' = 1 ()
- 2.3.4 'branch list'
- 2.3.4.1 'finelateral 2'
- 'allow branches to form above ground' = 0 () 'branching frequency'(cm)=f{'uniform distribution'} minimum=0.4 maximum=0.6 'length root tip' = 1.5 (cm)
- 2.3.5 'branching angle' = 62.83 (degrees)
- 2.3.6 'density' = 0.094 (g cm⁻³)
- 2.3.7 'diameter' = 0.025 (cm)
- 2.3.8 'gravitropism.v2' = 0 0 0 (cm)
- 2.3.9 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 0.35 6 0 1000 0 }
- 2.3.10 'length root tip without xylem vessels' = 2 (cm)
- 2.3.11 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.5 maximum=1.5 mean=1 stdev=0.1
- 2.3.12 'nitrate'
- 2.3.12.1 'Cmin' = 0.0017 (umol ml⁻¹)
- 2.3.12.2 'Imax' = 1.27 (umol cm⁻² day⁻¹)
- 2.3.12.3 'Km' = 0.0027 (umol ml⁻¹)
- 2.3.12.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
- 2.3.12.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.3.13 'number of xylem poles' = 4 ()
- 2.3.14 'phosphorus'

- 2.3.14.1 'Cmin' = 0.0002 (umol ml⁻¹)
- 2.3.14.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
- 2.3.14.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
- 2.3.14.4 'Km' = 0.00545 (umol ml⁻¹)
- 2.3.14.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
- 2.3.14.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.3.15 'potassium'
 - 2.3.15.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.3.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.3.15.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.3.15.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.3.15.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.3.15.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.3.16 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 1 0.000416 60 0.000416 }
- 2.3.17 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.3.18 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 1e-06 }
- 2.3.19 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.3.20 'root class ID' = 98 ()
- 2.3.21 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.3.22 'root hair diameter' = 0.0005 (cm)
- 2.3.23 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.3.24 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.05 maximum=0.05
- 2.3.25 'top boundary' = 1 ()
- 2.4. 'finelateral 2'
 - 2.4.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.4.2 'bottom boundary' = 1 ()
 - 2.4.3 'bounce of the side' = 1 ()
 - 2.4.4 'branch list'
 - 2.4.5 'branching angle' = 62.83 (degrees)
 - 2.4.6 'density' = 0.094 (g cm⁻³)
 - 2.4.7 'diameter' = 0.015 (cm)
 - 2.4.8 'gravitropism.v2' = 0 0 0 (cm)
 - 2.4.9 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.001 1 0.28 4 0 1000 0 }
 - 2.4.10 'length root tip without xylem vessels' = 2 (cm)

- 2.4.11 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.5 maximum=1.5
mean=1 stdev=0.1
- 2.4.12 'nitrate'
- 2.4.12.1 'Cmin' = 0.0017 (umol ml⁻¹)
- 2.4.12.2 'Imax' = 1.27 (umol cm⁻² day⁻¹)
- 2.4.12.3 'Km' = 0.0027 (umol ml⁻¹)
- 2.4.12.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
- 2.4.12.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.4.13 'number of xylem poles' = 4 ()
- 2.4.14 'phosphorus'
- 2.4.14.1 'Cmin' = 0.0002 (umol ml⁻¹)
- 2.4.14.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
- 2.4.14.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
- 2.4.14.4 'Km' = 0.00545 (umol ml⁻¹)
- 2.4.14.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
- 2.4.14.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.4.15 'potassium'
- 2.4.15.1 'Cmin' = 0.002 (umol ml⁻¹)
- 2.4.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
- 2.4.15.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
- 2.4.15.4 'Km' = 0.014 (umol ml⁻¹)
- 2.4.15.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
- 2.4.15.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.4.16 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0
0 1 0.000416 60 0.000416 }
- 2.4.17 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y
pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.4.18 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{
0 5e-06 100 1e-06 }
- 2.4.19 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6
0.04 1000 0.04 }
- 2.4.20 'root class ID' = 98 ()
- 2.4.21 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000
10 2000 30 0 2000 0 }
- 2.4.22 'root hair diameter' = 0.0005 (cm)
- 2.4.23 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.4.24 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.05 maximum=0.05
- 2.4.25 'top boundary' = 1 ()
- 2.5. 'hypocotyl'
- 2.5.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 100 0 }
- 2.5.2 'bottom boundary' = 0 ()

- 2.5.3 'bounce of the side' = 1 ()
- 2.5.4 'branch list'
 - 2.5.4.1 'braceroots'
 - 'allometric scaling' = 1 () 'branching spatial offset' = 4 (cm) 'branching time offset' = 25 (day) 'number of branches/whorl' = 14 (#)
 - 2.5.4.2 'braceroots to '
 - 'allometric scaling' = 1 () 'branching delay' = 14 (day) 'branching frequency' = 5 (cm) 'branching spatial offset' = 7 (cm) 'branching time offset' = 36 (day) 'number of branches/whorl' = 20 (#)
 - 2.5.4.3 'nodalroots'
 - 'branching spatial offset' = 1.5 (cm) 'branching time offset' = 9 (day) 'number of branches/whorl' = 3 (#)
 - 2.5.4.4 'nodalroots2 '
 - 'allometric scaling' = 1 () 'branching spatial offset' = 1.9 (cm) 'branching time offset' = 16 (day) 'number of branches/whorl' = 4 (#)
 - 2.5.4.5 'nodalroots3'
 - 'allometric scaling' = 1 () 'branching spatial offset' = 2.1 (cm) 'branching time offset' = 20 (day) 'number of branches/whorl' = 5 (#)
 - 2.5.4.6 'nodalroots4'
 - 'allometric scaling' = 1 () 'branching spatial offset' = 2.3 (cm) 'branching time offset' = 23 (day) 'number of branches/whorl' = 6 (#)
- 2.5.5 'density' = 0.094 (g cm⁻³)
- 2.5.6 'diameter' = 0.15 (cm)
- 2.5.7 'gravitropism' = -1 ()
- 2.5.8 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=0.5 maximum=1
- 2.5.9 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1 1 2 2 2 3 2 5 0 1000 0 }
- 2.5.10 'length root tip without xylem vessels' = 2 (cm)
- 2.5.11 'nitrate'
 - 2.5.11.1 'Cmin' = 0 (umol ml⁻¹)
 - 2.5.11.2 'Imax' = 0 (umol cm⁻² day⁻¹)
 - 2.5.11.3 'Km' = 1 (umol ml⁻¹)
 - 2.5.11.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.5.11.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.5.12 'number of xylem poles' = 61 ()
- 2.5.13 'phosphorus'
 - 2.5.13.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.5.13.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.5.13.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.5.13.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.5.13.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.5.13.6 'optimal nutrient concentration' = 60 (umol g⁻¹)

- 2.5.14 'potassium'
 - 2.5.14.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.5.14.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.5.14.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.5.14.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.5.14.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.5.14.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.5.15 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 60 0 }
- 2.5.16 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.5.17 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0 100 0 }
- 2.5.18 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.5.19 'root class ID' = 97 ()
- 2.5.20 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 0 2000 0 }
- 2.5.21 'root hair diameter' = 0.0005 (cm)
- 2.5.22 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.5.23 'soil impedance' = 0.3 ()
- 2.5.24 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.3 maximum=0.3
- 2.5.25 'top boundary' = 0 ()
- 2.6. 'lateral'
 - 2.6.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.6.2 'bottom boundary' = 1 ()
 - 2.6.3 'bounce of the side' = 1 ()
 - 2.6.4 'branch list'
 - 2.6.4.1 'finelateral'
 - 'allow branches to form above ground' = 0 () 'branching frequency'(cm)=f{'uniform distribution'} minimum=0.15 maximum=0.35 'length root tip' = 4 (cm)
 - 2.6.5 'branching angle' = 90 (degrees)
 - 2.6.6 'cannot grow up' = 1 ()
 - 2.6.7 'density' = 0.094 (g cm⁻³)
 - 2.6.8 'diameter' = 0.04 (cm)
 - 2.6.9 'gravitropism.v2' = 0 0 0 (cm)
 - 2.6.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 0.2 3 0.4 7 1 11 0 1000 0 }
 - 2.6.11 'length root tip without xylem vessels' = 2 (cm)
 - 2.6.12 'longitudinal growth rate multiplier'(cm)=f{'lognormal distribution'} minimum=0.1 maximum=2 mean=-0.440986 stdev=0.410637

- 2.6.13 'nitrate'
 - 2.6.13.1 'Cmin' = 0.0017 (umol ml⁻¹)
 - 2.6.13.2 'Imax' = 1.27 (umol cm⁻² day⁻¹)
 - 2.6.13.3 'Km' = 0.0027 (umol ml⁻¹)
 - 2.6.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.6.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.6.14 'number of xylem poles' = 4 ()
- 2.6.15 'phosphorus'
 - 2.6.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.6.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.6.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.6.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.6.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.6.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.6.16 'potassium'
 - 2.6.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.6.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.6.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.6.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.6.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.6.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.6.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000416 60 0.000416 }
- 2.6.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0 0.3 0.7 0.6 1 }
- 2.6.19 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 3e-06 }
- 2.6.20 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.6.21 'root class ID' = 98 ()
- 2.6.22 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.6.23 'root hair diameter' = 0.0005 (cm)
- 2.6.24 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.6.25 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.1 maximum=0.1
- 2.6.26 'top boundary' = 1 ()
- 2.7. 'lateral of crown roots'
 - 2.7.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.7.2 'bottom boundary' = 1 ()
 - 2.7.3 'bounce of the side' = 1 ()

- 2.7.4 'branch list'
- 2.7.5 'branching angle' = 90 (degrees)
- 2.7.6 'cannot grow up' = 1 ()
- 2.7.7 'density' = 0.094 (g cm⁻³)
- 2.7.8 'diameter' = 0.07 (cm)
- 2.7.9 'gravitropism' = 0 ()
- 2.7.10 'gravitropism.v2' = 0 0 0 (cm)
- 2.7.11 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.1 1 0.5 3 1.2 12 1.2 18
0 1000 0 }
- 2.7.12 'length root tip without xylem vessels' = 2 (cm)
- 2.7.13 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.1 maximum=1
mean=0.4 stdev=0.3
- 2.7.14 'nitrate'
 - 2.7.14.1 'Cmin' = 0.0017 (umol ml⁻¹)
 - 2.7.14.2 'Imax' = 1.27 (umol cm⁻² day⁻¹)
 - 2.7.14.3 'Km' = 0.0027 (umol ml⁻¹)
 - 2.7.14.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.7.14.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.7.15 'number of xylem poles' = 4 ()
- 2.7.16 'phosphorus'
 - 2.7.16.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.7.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.7.16.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.7.16.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.7.16.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.7.16.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.7.17 'potassium'
 - 2.7.17.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.7.17.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.7.17.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.7.17.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.7.17.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.7.17.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.7.18 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0
0 1 0.000216 60 0.000216 }
- 2.7.19 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y
pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.7.20 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{
0 5e-06 100 4e-06 }
- 2.7.21 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6
0.04 1000 0.04 }

- 2.7.22 'root class ID' = 98 ()
- 2.7.23 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.7.24 'root hair diameter' = 0.0005 (cm)
- 2.7.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.7.26 'soil impedance' = 0.05 ()
- 2.7.27 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.05 maximum=0.05
- 2.7.28 'top boundary' = 1 ()
- 2.8. 'local resource responses'
 - 2.8.1 'impact on:gravitropism'
 - 2.8.1.1 'aggregation function' = average ()
 - 2.8.1.2 'impact by:nitrate' ()=f{'localConcentration'} () x,y pairs :{ 0 3 100 1 2000 1 }
 - 2.8.1.3 'impact by:phosphorus' ()=f{'localConcentration'} () x,y pairs :{ 0 0.3 15 1 1000 1 }
 - 2.8.1.4 'impact by:potassium' ()=f{'localConcentration'} () x,y pairs :{ 0 1 1000 1 }
- 2.9. 'nodalroots'
 - 2.9.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.9.2 'bottom boundary' = 1 ()
 - 2.9.3 'bounce of the side' = 1 ()
 - 2.9.4 'branch list'
 - 2.9.5 'branching angle' = 160 (degrees)
 - 2.9.6 'cannot grow up' = 1 ()
 - 2.9.7 'density' = 0.094 (g cm⁻³)
 - 2.9.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.12 10 0.09 100 0.09 }
 - 2.9.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
 - 2.9.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 1 3 4.5 28 4.5 38 0 1000 0 }
 - 2.9.11 'length root tip without xylem vessels' = 2 (cm)
 - 2.9.12 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.6 maximum=1.2 mean=1 stdev=0.1
 - 2.9.13 'nitrate'
 - 2.9.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.9.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.9.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.9.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.9.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
 - 2.9.14 'number of xylem poles' = 10 ()
 - 2.9.15 'phosphorus'
 - 2.9.15.1 'Cmin' = 0.0002 (umol ml⁻¹)

- 2.9.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
- 2.9.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
- 2.9.15.4 'Km' = 0.00545 (umol ml⁻¹)
- 2.9.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
- 2.9.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.9.16 'potassium'
 - 2.9.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.9.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.9.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.9.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.9.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.9.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.9.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.9.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.9.19 'regular topology' = 3 ()
- 2.9.20 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.9.21 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.9.22 'root class ID' = 101 ()
- 2.9.23 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.9.24 'root hair diameter' = 0.0005 (cm)
- 2.9.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.9.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.02 maximum=0.02
- 2.9.27 'top boundary' = 1 ()
- 2.9.28 'topology offset' = 0 ()
- 2.10. 'nodalroots 2'
 - 2.10.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.10.2 'bottom boundary' = 1 ()
 - 2.10.3 'bounce of the side' = 1 ()
 - 2.10.4 'branch list'
 - 2.10.5 'branching angle' = 150 (degrees)
 - 2.10.6 'cannot grow up' = 1 ()
 - 2.10.7 'density' = 0.094 (g cm⁻³)
 - 2.10.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.14 10 0.09 100 0.09 }
 - 2.10.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
 - 2.10.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 1 3 4.5 28 4.5 38 0 1000 0 }

- 2.10.11 'length root tip without xylem vessels' = 2 (cm)
- 2.10.12 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.6 maximum=1.2
mean=1 stdev=0.1
- 2.10.13 'nitrate'
 - 2.10.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.10.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.10.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.10.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.10.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.10.14 'number of xylem poles' = 18 ()
- 2.10.15 'phosphorus'
 - 2.10.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.10.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.10.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.10.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.10.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.10.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.10.16 'potassium'
 - 2.10.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.10.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.10.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.10.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.10.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.10.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.10.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.10.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.10.19 'regular topology' = 0 ()
- 2.10.20 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.10.21 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.10.22 'root class ID' = 101 ()
- 2.10.23 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.10.24 'root hair diameter' = 0.0005 (cm)
- 2.10.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.10.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.02 maximum=0.02
- 2.10.27 'top boundary' = 1 ()

- 2.10.28 'topology offset' = 0 ()
- 2.11. 'nodalroots 3'
 - 2.11.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.11.2 'bottom boundary' = 1 ()
 - 2.11.3 'bounce of the side' = 1 ()
 - 2.11.4 'branch list'
 - 2.11.5 'branching angle' = 140 (degrees)
 - 2.11.6 'cannot grow up' = 1 ()
 - 2.11.7 'density' = 0.094 (g cm⁻³)
 - 2.11.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.16 10 0.1 100 0.1 }
 - 2.11.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
 - 2.11.10 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 1 3 4.5 28 4.5 38 0 1000 0 }
 - 2.11.11 'length root tip without xylem vessels' = 2 (cm)
 - 2.11.12 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.6 maximum=1.2 mean=1 stdev=0.1
 - 2.11.13 'nitrate'
 - 2.11.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.11.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.11.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.11.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.11.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
 - 2.11.14 'number of xylem poles' = 24 ()
 - 2.11.15 'phosphorus'
 - 2.11.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.11.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.11.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.11.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.11.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.11.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
 - 2.11.16 'potassium'
 - 2.11.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.11.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.11.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.11.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.11.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.11.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
 - 2.11.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }

- 2.11.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.11.19 'regular topology' = 0 ()
- 2.11.20 'relative carbon cost of exudation' ($\text{g cm}^{-1} \text{ day}^{-1}$)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.11.21 'relative respiration' ($\text{g g}^{-1} \text{ day}^{-1}$)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.11.22 'root class ID' = 101 ()
- 2.11.23 'root hair density' ($\# \text{ cm}^{-2}$)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.11.24 'root hair diameter' = 0.0005 (cm)
- 2.11.25 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.11.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.02 maximum=0.02
- 2.11.27 'top boundary' = 1 ()
- 2.11.28 'topology offset' = 0 ()
- 2.12. 'nodalroots 4'
 - 2.12.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.12.2 'bottom boundary' = 1 ()
 - 2.12.3 'bounce of the side' = 1 ()
 - 2.12.4 'branch list'
 - 2.12.5 'branching angle' = 130 (degrees)
 - 2.12.6 'cannot grow up' = 1 ()
 - 2.12.7 'density' = 0.094 (g cm^{-3})
 - 2.12.8 'diameter' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0.2 10 0.11 100 0.11 }
 - 2.12.9 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.01 maximum=-0.005
 - 2.12.10 'growth rate' (cm day^{-1})=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 1 3 4.5 28 4.5 38 0 1000 0 }
 - 2.12.11 'length root tip without xylem vessels' = 2 (cm)
 - 2.12.12 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.6 maximum=1.2 mean=1 stdev=0.1
 - 2.12.13 'nitrate'
 - 2.12.13.1 'Cmin' = 0.001 (umol ml^{-1})
 - 2.12.13.2 'Imax' ($\text{umol cm}^{-2} \text{ day}^{-1}$)=f{'time since creation'} (day) x,y pairs :{ 0 1.21 2 2.1 40 2.1 }
 - 2.12.13.3 'Km' (umol ml^{-1})=f{'time since creation'} (day) x,y pairs :{ 0 0.0157 2 0.0522 40 0.0522 }
 - 2.12.13.4 'minimal nutrient concentration' = 600 (umol g^{-1})
 - 2.12.13.5 'optimal nutrient concentration' = 1200 (umol g^{-1})
 - 2.12.14 'number of xylem poles' = 32 ()
 - 2.12.15 'phosphorus'
 - 2.12.15.1 'Cmin' = 0.0002 (umol ml^{-1})

- 2.12.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
- 2.12.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
- 2.12.15.4 'Km' = 0.00545 (umol ml⁻¹)
- 2.12.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
- 2.12.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.12.16 'potassium'
 - 2.12.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.12.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.12.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.12.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.12.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.12.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.12.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.12.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.12.19 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.12.20 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.12.21 'root class ID' = 101 ()
- 2.12.22 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.12.23 'root hair diameter' = 0.0005 (cm)
- 2.12.24 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.12.25 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.02 maximum=0.02
- 2.12.26 'top boundary' = 1 ()
- 2.13. 'primaryroot'
 - 2.13.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.13.2 'bottom boundary' = 1 ()
 - 2.13.3 'bounce of the side' = 1 ()
 - 2.13.4 'branch list'
 - 2.13.4.1 'seminal'
 - 'allow branches to form above ground' = 0 () 'branching frequency' = 1 (cm) 'branching time offset' = 1 (day) 'max number of branches' = 5 (#) 'number of branches/whorl' = 5 (#)
 - 2.13.5 'branching angle' = 0 (degrees)
 - 2.13.6 'cannot grow up' = 1 ()
 - 2.13.7 'density' = 0.094 (g cm⁻³)
 - 2.13.8 'diameter' = 0.065 (cm)

- 2.13.9 'gravitropism' = 0.01 ()
- 2.13.10 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.015 maximum=-0.005
- 2.13.11 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 4.5 28 4.5 38 0 1000 0 }
- 2.13.12 'length root tip without xylem vessels' = 2 (cm)
- 2.13.13 'nitrate'
 - 2.13.13.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.13.13.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 2.3 2 1.92 40 1.92 }
 - 2.13.13.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0105 2 0.0161 40 0.0161 }
 - 2.13.13.4 'minimal nutrient concentration' = 600 (umol g⁻¹)
 - 2.13.13.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.13.14 'number of xylem poles' = 8 ()
- 2.13.15 'phosphorus'
 - 2.13.15.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.13.15.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.13.15.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.13.15.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.13.15.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.13.15.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.13.16 'potassium'
 - 2.13.16.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.13.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.13.16.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.13.16.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.13.16.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.13.16.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.13.17 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.000216 30 0.000116 40 5e-05 60 0 }
- 2.13.18 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.13.19 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.13.20 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.13.21 'root class ID' = 100 ()
- 2.13.22 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.13.23 'root hair diameter' = 0.0005 (cm)
- 2.13.24 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.13.25 'soil impedance' = 0.05 ()
- 2.13.26 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.05 maximum=0.05

- 2.13.27 'top boundary' = 1 ()
- 2.14. 'resources'
 - 2.14.1 'Cto dry weight ratio' = 0.45 (100%)
 - 2.14.2 'carbon allocation to leafs factor' (100%)=f{'time'} (day) x,y pairs :{ 0 1 10 0.7 20 0.45 33 0.42 40 0.4 60 0.4 }
 - 2.14.3 'carbon allocation to roots factor' (100%)=f{'time'} (day) x,y pairs :{ 0 1 1 1 6 0.4 20 0.2 40 0.17 80 0.17 }
 - 2.14.4 'carbon cost of nitrate uptake' = 1.392e-05 (g umol⁻¹)
 - 2.14.5 'max carbon allocation to shoot' = 0.82 (100%)
 - 2.14.6 'nitrate'
 - 2.14.6.1 'initial nutrient uptake' = 285 (umol)
 - 2.14.7 'phosphorus'
 - 2.14.7.1 'initial nutrient uptake' = 20 (umol)
 - 2.14.8 'potassium'
 - 2.14.8.1 'initial nutrient uptake' = 27 (umol)
 - 2.14.9 'reserve allocation rate' (% day⁻¹)=f{'time'} (day) x,y pairs :{ 0 0.01 1 0.02 2 0.04 3 0.04 10 0.2 11 0.2 1000 0.2 }
 - 2.14.10 'seed size' = 0.15 (g)
- 2.15. 'seminal'
 - 2.15.1 'aerenchyma formation' (100%)=f{'time since creation'} (day) x,y pairs :{ 0 0 3 0 5 0.1 10 0.25 20 0.393 1000 0.393 }
 - 2.15.2 'bottom boundary' = 1 ()
 - 2.15.3 'bounce of the side' = 1 ()
 - 2.15.4 'branch list'
 - 2.15.5 'branching angle' = 90 (degrees)
 - 2.15.6 'cannot grow up' = 1 ()
 - 2.15.7 'density' = 0.094 (g cm⁻³)
 - 2.15.8 'diameter' = 0.085 (cm)
 - 2.15.9 'gravitropism' = 0.004 ()
 - 2.15.10 'gravitropism.v2'(cm)=f{'uniform distribution'} minimum=-0.035 maximum=-0.025
 - 2.15.11 'growth rate' (cm day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.01 1 0.5 2 4.5 28 4.5 38 0 100 0 }
 - 2.15.12 'length root tip without xylem vessels' = 2 (cm)
 - 2.15.13 'longitudinal growth rate multiplier'(cm)=f{'normal distribution'} minimum=0.6 maximum=1.2 mean=1 stdev=0.1
 - 2.15.14 'nitrate'
 - 2.15.14.1 'Cmin' = 0.001 (umol ml⁻¹)
 - 2.15.14.2 'Imax' (umol cm⁻² day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 2.3 2 1.92 40 1.92 }
 - 2.15.14.3 'Km' (umol ml⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.0105 2 0.0161 40 0.0161 }
 - 2.15.14.4 'minimal nutrient concentration' = 600 (umol g⁻¹)

- 2.15.14.5 'optimal nutrient concentration' = 1200 (umol g⁻¹)
- 2.15.15 'number of xylem poles' = 6 ()
- 2.15.16 'phosphorus'
 - 2.15.16.1 'Cmin' = 0.0002 (umol ml⁻¹)
 - 2.15.16.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.15.16.3 'Imax' = 0.0555 (umol cm⁻² day⁻¹)
 - 2.15.16.4 'Km' = 0.00545 (umol ml⁻¹)
 - 2.15.16.5 'minimal nutrient concentration' = 30 (umol g⁻¹)
 - 2.15.16.6 'optimal nutrient concentration' = 60 (umol g⁻¹)
- 2.15.17 'potassium'
 - 2.15.17.1 'Cmin' = 0.002 (umol ml⁻¹)
 - 2.15.17.2 'Efflux' = 1e-06 (umol cm⁻¹ day⁻¹)
 - 2.15.17.3 'Imax' = 0.467 (umol cm⁻² day⁻¹)
 - 2.15.17.4 'Km' = 0.014 (umol ml⁻¹)
 - 2.15.17.5 'minimal nutrient concentration' = 117 (umol g⁻¹)
 - 2.15.17.6 'optimal nutrient concentration' = 234 (umol g⁻¹)
- 2.15.18 'radial hydraulic conductivity' (cm day⁻¹ hPa⁻¹)=f{'time since planting'} (day) x,y pairs :{ 0 0 1 0.000216 10 0.000216 20 0.00025 30 0.000216 40 0.0001 60 0 }
- 2.15.19 'reduction in respiration due to aerenchyma' (100%)=f{'aerenchymaFormation'} (100%) x,y pairs :{ 0 0 0.3 0.7 0.6 1 }
- 2.15.20 'regular topology' = 1 ()
- 2.15.21 'relative carbon cost of exudation' (g cm⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 5e-06 100 5e-06 }
- 2.15.22 'relative respiration' (g g⁻¹ day⁻¹)=f{'time since creation'} (day) x,y pairs :{ 0 0.09 2 0.04 6 0.04 1000 0.04 }
- 2.15.23 'root class ID' = 99 ()
- 2.15.24 'root hair density' (# cm⁻²)=f{'time since creation'} (day) x,y pairs :{ 0 2000 1 2000 2 2000 10 2000 30 0 2000 0 }
- 2.15.25 'root hair diameter' = 0.0005 (cm)
- 2.15.26 'root hair length' (cm)=f{'time since creation'} (day) x,y pairs :{ 0 0 1 0 2 0.028 2000 0.028 }
- 2.15.27 'soil impedance' = 0.02 ()
- 2.15.28 'soil impedance.v2'(cm)=f{'uniform distribution'} minimum=-0.04 maximum=0.04
- 2.15.29 'top boundary' = 1 ()
- 2.16. 'shoot'
 - 2.16.1 'aerenchyma photosynthesis mitigation' = 0.5 (100%)
 - 2.16.2 'area per plant' = 1600 (cm²)
 - 2.16.3 'extinction coefficient' = 0.85 ()
 - 2.16.4 'leaf area expansion rate' (cm² day⁻¹)=f{'time'} (day) x,y pairs :{ 0 0 2 0 2.38 2.32 2.77 3.24 3.15 3.93 3.54 4.41 3.92 4.72 4.3 4.87 4.69 4.89 5.07 4.81 5.45 4.64 5.84 4.41 6.22 4.14 6.61 3.84 6.99 3.55 7.37 3.27 7.76 3.02 8.14 2.83 8.53 2.71 8.91 2.66 9.29 2.71 9.68 2.88 10.06 3.16 10.44 3.58 10.83 4.15 11.21 4.87 11.6 5.76 11.98 6.82 12.36 8.07 12.75 9.5 13.13 11.13 13.52 }

- 12.96 13.9 14.99 14.28 17.23 14.67 19.68 15.05 22.35 15.43 25.22 15.82 28.32 16.2 31.62 16.59
35.14 16.97 38.87 17.35 42.81 17.74 46.95 18.12 51.29 18.51 55.83 18.89 60.55 19.27 65.45 19.66
70.53 20.04 75.76 20.42 81.16 20.81 86.69 21.19 92.36 21.58 98.15 21.96 104.05 22.34 110.04
22.73 116.11 23.11 122.24 23.49 128.42 23.88 134.63 24.26 140.86 24.65 147.08 25.03 153.28
25.41 159.42 25.8 165.51 26.18 171.5 26.57 177.39 26.95 183.14 27.33 188.73 27.72 194.13 28.1
199.33 28.48 204.29 28.87 208.98 29.25 213.38 29.64 217.45 30.02 221.18 30.4 224.52 30.79
227.44 31.17 229.92 31.56 231.91 31.94 233.39 33.09 234.36 50 234.36 80 0 }
- 2.16.5 'light use efficiency' = 3.8e-07 (g umol⁻¹)
- 2.16.6 'nitrate'
- 2.16.6.1 'leaf minimal nutrient concentration' (umol g⁻¹)=f{'time'} (day) x,y pairs :{ 0 1200 80 800
}
- 2.16.6.2 'leaf optimal nutrient concentration' (umol g⁻¹)=f{'time'} (day) x,y pairs :{ 0 2500 80
1500 }
- 2.16.6.3 'stem minimal nutrient concentration' = 400 (umol g⁻¹)
- 2.16.6.4 'stem optimal nutrient concentration' = 800 (umol g⁻¹)
- 2.16.7 'phosphorus'
- 2.16.7.1 'leaf minimal nutrient concentration' = 35 (umol g⁻¹)
- 2.16.7.2 'leaf optimal nutrient concentration' = 70 (umol g⁻¹)
- 2.16.7.3 'stem minimal nutrient concentration' = 15 (umol g⁻¹)
- 2.16.7.4 'stem optimal nutrient concentration' = 30 (umol g⁻¹)
- 2.16.8 'potassium'
- 2.16.8.1 'leaf minimal nutrient concentration' = 273 (umol g⁻¹)
- 2.16.8.2 'leaf optimal nutrient concentration' = 508 (umol g⁻¹)
- 2.16.8.3 'stem minimal nutrient concentration' = 117 (umol g⁻¹)
- 2.16.8.4 'stem optimal nutrient concentration' = 250 (umol g⁻¹)
- 2.16.9 'relative potential transpiration' = 100 (cm³ g⁻¹)
- 2.16.10 'relative respiration rate leaves' = 0.04 (g g⁻¹ day⁻¹)
- 2.16.11 'relative respiration rate stems' = 0.02 (g g⁻¹ day⁻¹)
- 2.16.12 'specific leaf area' (g cm⁻²)=f{'time'} (day) x,y pairs :{ 0 0.0015 24 0.0026 50 0.0032 100 0.0032
}
- 2.17. 'stress impact factors'
- 2.17.1 'impact on:leaf area expansion rate'
- 2.17.1.1 'impact by:nitrate' ()=f{'nitrate stress factor'} () x,y pairs :{ 0 0 0.3 0.1 1 1 }
- 2.17.1.2 'impact by:phosphorus' ()=f{'phosphorus stress factor'} () x,y pairs :{ 0 0 1 1 }
- 2.17.1.3 'impact by:potassium' ()=f{'potassium stress factor'} () x,y pairs :{ 0 0 0.2 0.5 1 1 }
- 2.17.2 'impact on:photosynthesis'
- 2.17.2.1 'impact by:nitrate' ()=f{'nitrate stress factor'} () x,y pairs :{ 0 0 0.4 0.5 1 1 }
- 2.17.2.2 'impact by:phosphorus' ()=f{'phosphorus stress factor'} () x,y pairs :{ 0 0.5 0.5 1 1 1 }
- 2.17.2.3 'impact by:potassium' ()=f{'potassium stress factor'} () x,y pairs :{ 0 0 1 1 }
- 2.17.3 'impact on:root segment secondary growth'
- 2.17.3.1 'impact by:nitrate' ()=f{'nitrate stress factor'} () x,y pairs :{ 0 0 1 1 }
- 2.17.3.2 'impact by:phosphorus' ()=f{'phosphorus stress factor'} () x,y pairs :{ 0 0 1 1 }
- 2.17.3.3 'impact by:potassium' ()=f{'potassium stress factor'} () x,y pairs :{ 0 0 1 1 }