# 1 Soybean

The generic plant model

**Properties (Outputs)**

| Name | Description | Units | Type | Settable? |
|---|---|---|---|---|
| AboveGround | Above ground weight | | Biomass | True |
| AboveGroundHarvestable | Above ground weight | | Biomass | False |
| AssimilateAvailable | Amount of assimilate available to be damaged. | | double | False |
| CultivarNames | Gets a list of cultivar names | | String[] | False |
| DaysAfterEnding | Counter for the number of days after corp being ended. USed to clean up data the day after an EndCrop, enabling some reporting. | | int32 | True |
| DaysAfterSowing | Number of days after sowing. | | int32 | False |
| IsAlive | Return true if plant is alive and in the ground. | | boolean | True |
| IsEmerged | Return true if plant has emerged | | boolean | False |
| IsEnding | Returns true if the crop is being ended. Used to clean up data the day after an EndCrop, enabling some reporting. | | boolean | True |
| IsReadyForHarvesting | Returns true if the crop is ready for harvesting | | boolean | False |
| LAI | Leaf area index. | | double | False |
| Organs | Gets the organs. | | IOrgan[] | True |
| PlantType | Used by several organs to determine the type of crop. | | String | True |
| Population | Gets or sets the plant population.Number of plants per meter2 | /m2 | double | True |
| SowingData | The sowing data | | SowingParameters | True |
| SowingDate | Holds the date of sowing | | datetime | True |

**Links (Dependencies)**

| Name | Type | Optional? |
|---|---|---|
| Arbitrator | IArbitrator | True |
| clock | IClock | False |
| Leaf | ICanopy | True |
| mortalityRate | IFunction | False |
| PhenologyI | Phenology | False |
| Root | IRoot | True |
| structure | IStructure | True |
| summary | ISummary | False |

**Events published**

| Name | Type |
|---|---|
| Cutting | Void Cutting (Object sender, EventArgs e) |
| Flowering | Void Flowering (Object sender, EventArgs e) |
| Grazing | Void Grazing (Object sender, EventArgs e) |
| Harvesting | Void Harvesting (Object sender, EventArgs e) |
| LeafPlucking | Void LeafPlucking (Object sender, EventArgs e) |
| PlantEnding | Void PlantEnding (Object sender, EventArgs e) |
| PlantSowing | Void PlantSowing (Object sender, SowingParameters e) |
| Pruning | Void Pruning (Object sender, EventArgs e) |
| Sowing | Void Sowing (Object sender, EventArgs e) |

**Methods (callable from manager)**

| Name | Description |
|---|---|
| ClearChildLists | void ClearChildLists() |
| Document | void Document(ITagList tags, int32 headingLevel, int32 indent) |
| EndCrop | void EndCrop()<br>*End the crop.* |
| Equals | boolean Equals(Object obj) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |

| Name | Description |
|---|---|
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAncestor | IModel FindAncestor(String name) |
| FindAncestor | T FindAncestor() |
| FindAncestor | T FindAncestor(String name) |
| FindByPath | IVariable FindByPath(String path, boolean ignoreCase) |
| FindChild | IModel FindChild(String name) |
| FindChild | T FindChild() |
| FindChild | T FindChild(String name) |
| FindDescendant | IModel FindDescendant(String name) |
| FindDescendant | T FindDescendant() |
| FindDescendant | T FindDescendant(String name) |
| FindInScope | IModel FindInScope(String name) |
| FindInScope | T FindInScope() |
| FindInScope | T FindInScope(String name) |
| FindSibling | IModel FindSibling(String name) |
| FindSibling | T FindSibling() |
| FindSibling | T FindSibling(String name) |
| GetHashCode | int32 GetHashCode() |

| Name | Description |
|---|---|
| GetModelParameterNames | StringList<br>GetModelParameterNames() |
| GetType | Type GetType() |
| Harvest | void Harvest()<br>*Harvest the crop* |
| Harvest | void Harvest(RemovalFractions removalData)<br>*Harvest the crop* |
| IsChildAllowable | boolean IsChildAllowable(Type type) |
| OnCreated | void OnCreated() |
| OnPreLink | void OnPreLink() |
| ParentAllDescendants | void ParentAllDescendants() |
| ReduceCanopy | void ReduceCanopy(double deltaLAI) |
| ReducePopulation | void ReducePopulation(double newPlantPopulation) |
| ReduceRootLengthDensity | void ReduceRootLengthDensity(double rootLengthModifier) |
| RemoveAssimilate | void RemoveAssimilate(double deltaAssimilate) |
| RemoveBiomass | void RemoveBiomass(String biomassRemoveType, RemovalFractions removalData) |
| RemoveBiomass | Biomass RemoveBiomass(double amountToRemove) |
| RemoveBiomass | void RemoveBiomass(String organName, String biomassRemoveType, OrganBiomassRemovalType biomassToRemove) |
| SetEmergenceDate | void SetEmergenceDate(String emergencedate) |
| SetGerminationDate | void SetGerminationDate(String germinationdate) |

| Name | Description |
|---|---|
| Sow | void Sow(String cultivar, double population, double depth, double rowSpacing, double maxCover, double budNumber, double rowConfig) |
| ToString | String ToString() |

# 2 Soybean

Biomass of plant organs

**Properties (Outputs)**

| Name | Description | Units | Type | Settable? |
|---|---|---|---|---|
| DMDOfStructural | Dry matter digestibility. 0.7 for live, 0.4 for dead | | double | True |
| MetabolicN | Gets or sets the metabolic n. | g/m^2 | double | True |
| MetabolicNConc | Gets the metabolic N concentration. | g/g | double | False |
| MetabolicWt | Gets or sets the metabolic wt. | g/m^2 | double | True |
| N | Gets the N amount. | g/m^2 | double | False |
| NConc | Gets the N concentration. | g/g | double | False |
| StorageN | Gets or sets the non structural n. | g/m^2 | double | True |
| StorageNConc | Gets the non structural N concentration. | g/g | double | False |
| StorageWt | Gets or sets the non structural wt. | g/m^2 | double | True |
| StructuralN | Gets or sets the structural n. | g/m^2 | double | True |
| StructuralNConc | Gets the structural N concentration. | g/g | double | False |
| StructuralWt | Gets or sets the structural wt. | g/m^2 | double | True |
| Wt | Gets the wt. | g/m^2 | double | False |

**Methods (callable from manager)**

| Name | Description |
|---|---|
| Add | void Add(Biomass a) |
| Clear | void Clear()<br><br>*Clears this instance.* |
| ClearChildLists | void ClearChildLists() |
| Equals | boolean Equals(Object obj) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |

| Name | Description |
|---|---|
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAncestor | IModel FindAncestor(String name) |
| FindAncestor | T FindAncestor() |
| FindAncestor | T FindAncestor(String name) |
| FindByPath | IVariable FindByPath(String path, boolean ignoreCase) |
| FindChild | IModel FindChild(String name) |
| FindChild | T FindChild() |
| FindChild | T FindChild(String name) |
| FindDescendant | IModel FindDescendant(String name) |
| FindDescendant | T FindDescendant() |
| FindDescendant | T FindDescendant(String name) |
| FindInScope | IModel FindInScope(String name) |
| FindInScope | T FindInScope() |
| FindInScope | T FindInScope(String name) |
| FindSibling | IModel FindSibling(String name) |
| FindSibling | T FindSibling() |
| FindSibling | T FindSibling(String name) |
| GetHashCode | int32 GetHashCode() |
| GetType | Type GetType() |
| IsChildAllowable | boolean IsChildAllowable(Type type) |
| Multiply | void Multiply(double scalar) |
| OnCreated | void OnCreated() |

| Name | Description |
|---|---|
| OnPreLink | void OnPreLink() |
| ParentAllDescendants | void ParentAllDescendants() |
| SetTo | void SetTo(Biomass a) |
| Subtract | void Subtract(Biomass a) |
| ToString | String ToString() |

# 3 SowingParameters

Parameters which control how a plant is sown.

**Properties (Outputs)**

| Name | Description | Units | Type | Settable? |
|---|---|---|---|---|
| BudNumber | The bud number | | double | True |
| Cultivar | The cultivar to be sown. | | String | True |
| Depth | The depth | mm | double | True |
| MaxCover | The maximum cover | | double | True |
| Population | The population. | /m2 | double | True |
| RowSpacing | The row spacing | mm | double | True |
| SkipDensityScale | The skip plant seed density adjustment | | double | True |
| SkipPlant | The skip plant | | double | True |
| SkipRow | The skip row | | double | True |
| SkipType | The skip type | | double | True |

**Methods (callable from manager)**

| Name | Description |
|---|---|
| Equals | boolean Equals(Object obj) |
| GetHashCode | int32 GetHashCode() |
| GetType | Type GetType() |
| ToString | String ToString() |

# 4 RemovalFractions

Data structure to hold removal and residue returns fractions for all plant organs

**Properties (Outputs)**

| Name | Description | Units | Type | Settable? |
|---|---|---|---|---|
| NodesToRemove | The nunber of Main-stem nodes to remove | | int32 | True |
| SetPhenologyStage | The Phenological stage that biomass removal resets phenology to. | | double | True |
| SetThinningProportion | The Phenological stage that biomass removal resets phenology to. | | double | True |

**Methods (callable from manager)**

| Name | Description |
|---|---|
| Equals | boolean Equals(Object obj) |
| GetFractionsForOrgan | OrganBiomassRemovalType GetFractionsForOrgan(String organName) |
| GetHashCode | int32 GetHashCode() |
| GetType | Type GetType() |
| SetFractionToRemove | void SetFractionToRemove(String organName, double fraction, String biomassType) |
| SetFractionToResidue | void SetFractionToResidue(String organName, double fraction, String biomassType) |

| Name | Description |
|---|---|
| ToString | String ToString() |

# 5 OrganBiomassRemovalType

Data passed to each organ when a biomass remove event occurs. The proportion of biomass to be removed from each organ is the sum of the FractionToRemove and the FractionToRedidues

**Properties (Outputs)**

| Name | Description | Units | Type | Settable? |
|---|---|---|---|---|
| FractionDeadToRemove | The amount of dead biomass taken from each organ and removeed from the zone on harvest, cut, graze or prune. Fraction of dead biomass to remove from plant (remove from the system) | | double | True |
| FractionDeadToResidue | The amount of dead biomass to removed from each organ and passed to residue pool on on harvest, cut, graze or prune Fraction of dead biomass to remove from plant (send to surface organic matter | | double | True |
| FractionLiveToRemove | The amount of live biomass taken from each organ and removeed from the zone on harvest, cut, graze or prune. Fraction of live biomass to remove from plant (remove from the system) | | double | True |
| FractionLiveToResidue | The amount of live biomass to removed from each organ and passed to residue pool on on harvest, cut, graze or prune Fraction of live biomass to remove from plant (send to surface organic matter | | double | True |

**Methods (callable from manager)**

| Name | Description |
|---|---|
| ClearChildLists | void ClearChildLists() |
| Equals | boolean Equals(Object obj) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors(String name) |
| FindAllAncestors | IEnumerable`1 FindAllAncestors() |

| Name | Description |
|---|---|
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren(String name) |
| FindAllChildren | IEnumerable`1 FindAllChildren() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants(String name) |
| FindAllDescendants | IEnumerable`1 FindAllDescendants() |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |
| FindAllInScope | IEnumerable`1 FindAllInScope(String name) |
| FindAllInScope | IEnumerable`1 FindAllInScope() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |
| FindAllSiblings | IEnumerable`1 FindAllSiblings(String name) |
| FindAllSiblings | IEnumerable`1 FindAllSiblings() |
| FindAncestor | IModel FindAncestor(String name) |
| FindAncestor | T FindAncestor() |
| FindAncestor | T FindAncestor(String name) |
| FindByPath | IVariable FindByPath(String path, boolean ignoreCase) |
| FindChild | IModel FindChild(String name) |
| FindChild | T FindChild() |
| FindChild | T FindChild(String name) |

| Name | Description |
| --- | --- |
| FindDescendant | IModel FindDescendant(String name) |
| FindDescendant | T FindDescendant() |
| FindDescendant | T FindDescendant(String name) |
| FindInScope | IModel FindInScope(String name) |
| FindInScope | T FindInScope() |
| FindInScope | T FindInScope(String name) |
| FindSibling | IModel FindSibling(String name) |
| FindSibling | T FindSibling() |
| FindSibling | T FindSibling(String name) |
| GetHashCode | int32 GetHashCode() |
| GetType | Type GetType() |
| IsChildAllowable | boolean IsChildAllowable(Type type) |
| OnCreated | void OnCreated() |
| OnPreLink | void OnPreLink() |
| ParentAllDescendants | void ParentAllDescendants() |
| ToString | String ToString() |