



User Manual

MAGI

Simulation tool
for sugarcane mill supply organization



Contacts:

Sandrine AUZOUX, data processing specialist, sandrine.auzoux@cirad.fr

Caroline Lejars, agronomist, caroline.lejars@cirad.fr

Pierre-Yves Le Gal, agronomist, pierre-yves.le_gal@cirad.fr

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Introduction

This software was developed under a CIRAD research project carried out in collaboration with INRA on supply organization in agro-industrial processing units.

It is based on a simulation model, focused on weekly management of cane flows from the field to the mill. This model can be used to study impacts on sugar production, reorganization of mill supply areas, modifications in delivery planning rules, as well as variations in the supply chain capacity and quality.

Unplanned delivery or processing events can occur at various supply chain levels. By simulating these unplanned events, the response capacity of a scenario can be tested with respect to disruptions in the planning system.

Magi is a support tool for negotiations between growers and industrial millers as it specifies possible ways of boosting total value while addressing all parties objectives and constraints.

Computer modelling of mill supply areas

Based on the weekly management of cane flows from a production unit to a mill, MAGI provides a representation of the mill supply process throughout a sugar season.

The model provides a spatial representation of sugarcane flows to the mill. It's based on partitioning of the mill supply area at three levels, i.e. mill, intermediate operators and production units, and also on the characterization of the routes of each production unit to the mill.

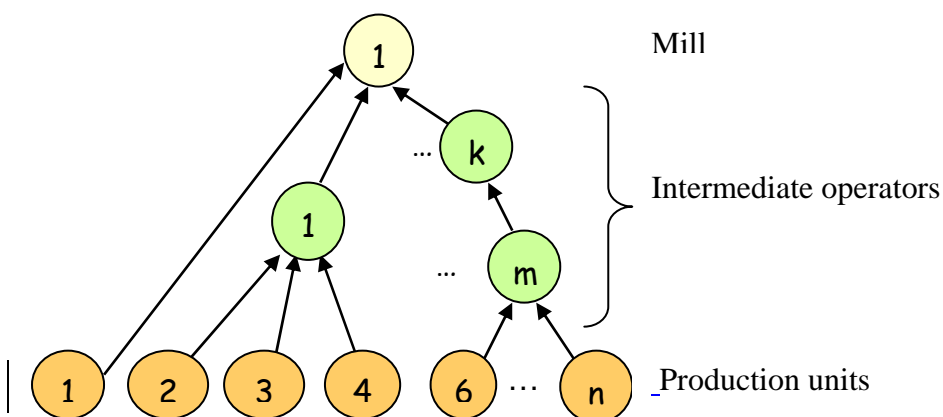
A production unit (PU) is an elementary entity postulated or treated as being homogeneous with respect to the delivered cane quality and rules applied to this cane by the mill for the management of cane supply planning and piloting processes. For example, a section of a mill, a group of farms, a homogeneous agroclimatic zone or a category of growers can define production units. The partitioning choices depend on the chosen simulation objectives.

Intermediate operators (IO) are entities who incorporate the contributions of various production units. Depending on their type, they are characterized by their transferring, transporting or loading capacity.

The mill is the third representational level of the mill supply area structural organization. It represents a request quantified by the cane milling capacity.

Routes represent pathways via which cane is hauled from the field to the mill. They are characterized by the dimensioning features of the transloading and transport facilities.

A pyramidal structure was adopted, consisting of N entities through which cane flows transit. Production units which deliver to intermediate operators are positioned at the base of the pyramid. There can be several operator levels but each entity can only deliver to one higher ranking entity. A simulation scenario is built only one mill. The user creates a library of scenarios for each studied mill.



A scenario combines a set of assumptions concerning the supply organization in a mill supply area. In *Magi*, it is based on only one mill, and a library of scenarios is compiled for each studied mill. *Magi* can thus be used to test various supplying scenarios with the aim of increasing sugar production at the mill gate, of taking full advantage of sugar content peaks

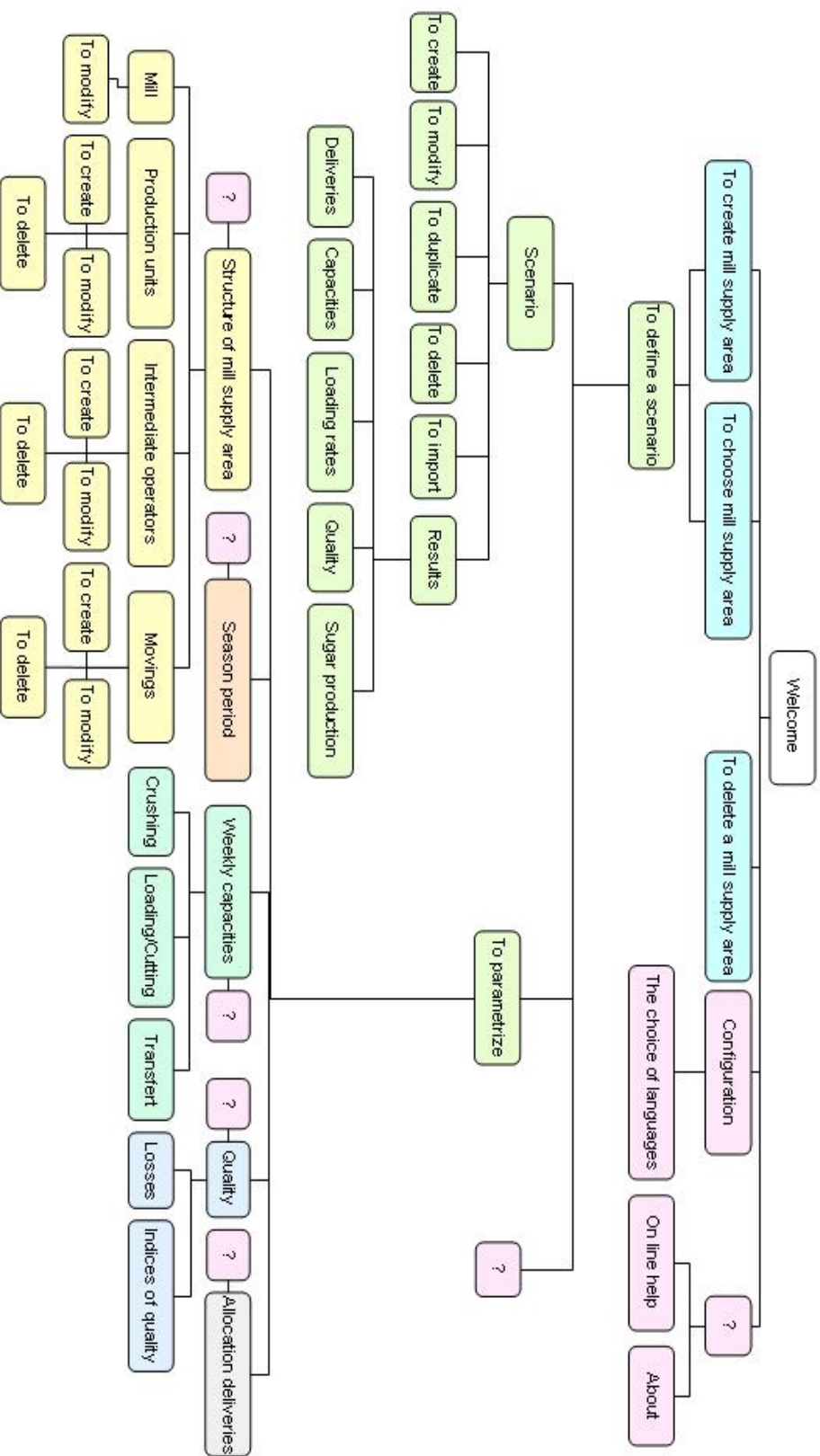
and minimizing losses to enhance the quality, while ensuring sufficient operating margins so as to be ready for unplanned events (mill shutdowns, conveyor breakdowns, bad weather, etc.)

The first step involves creating a mill with one or more associated scenarios. Then the PU and IO are characterised and the routes defined. Finally the delivered cane tonnages are quantified. The model makes intermediate calculations on the mill (weekly working period, crushing capacities, and season period) at the intermediate operator level concerning incoming and outgoing cane flows, and at the production unit level concerning delivery allocations.

The model can also be used to carry out simulations based on assumptions not concerning the attribution of growers' cane delivery rights. For example, the supply schedules (date and tonnage) can be adjusted so as to optimally take advantage of the spatiotemporal variability in sugar content of cane in a mill supply area. If maximum sugar content periods differ between production units, the model can calculate the gains that could be achieved by changing the delivery allocation. On the mill supply area scale, this involves determining homogeneous cane ripeness zones, determining delivery schedules per zone so as to optimally exploit sugar content patterns during the season period, and then assessing the potential advantages of this new organization in terms of final sugar production gains. Lastly, it is possible to test whether each new delivery allocation would involve redimensioning the harvesting, transporting, storing and milling equipment.

At exit, *Magi* displays some tables of weekly deliveries for each intermediate operator and production unit, some tables of weekly crushing mill capacities and weekly capacities related to the three quality variables, some tables of weekly quality variable values for each production unit, some tables of loading rates at all mill supply area levels and, obviously, some tables of the weekly sugar production for each production unit and at the mill gate.

Structure of the application

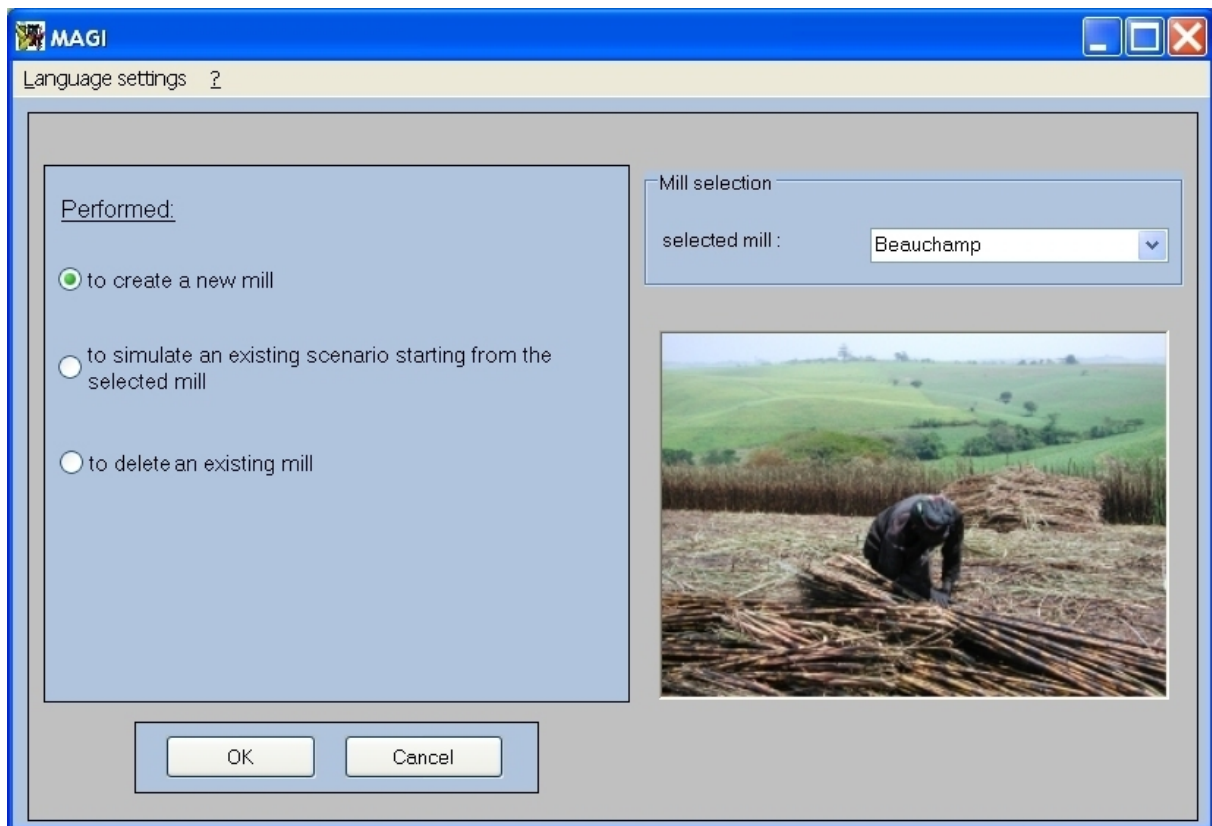


I. Software tutorial

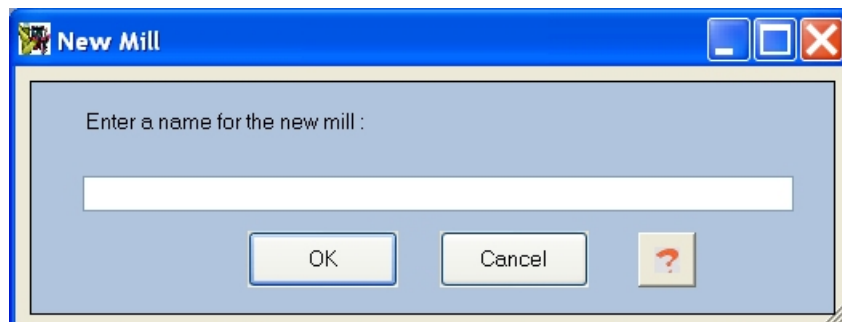
A. Mill supply area options

1. To create a new mill supply area

Select "To create a new mill supply area", and then click "OK".

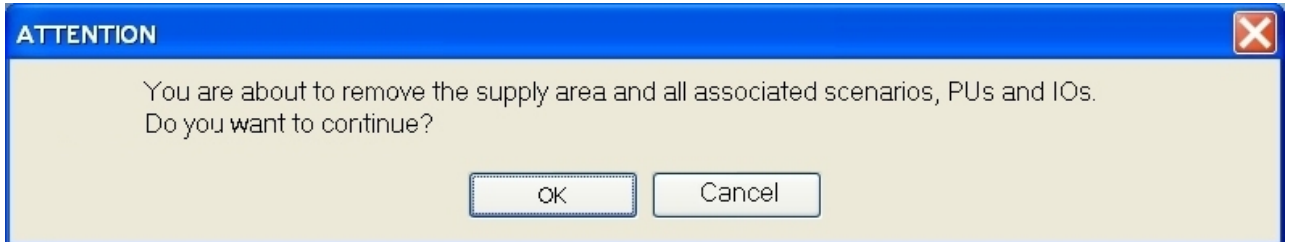


The following window is displayed. Enter a name of the mill supply area (usually the mill name) and click **OK**".



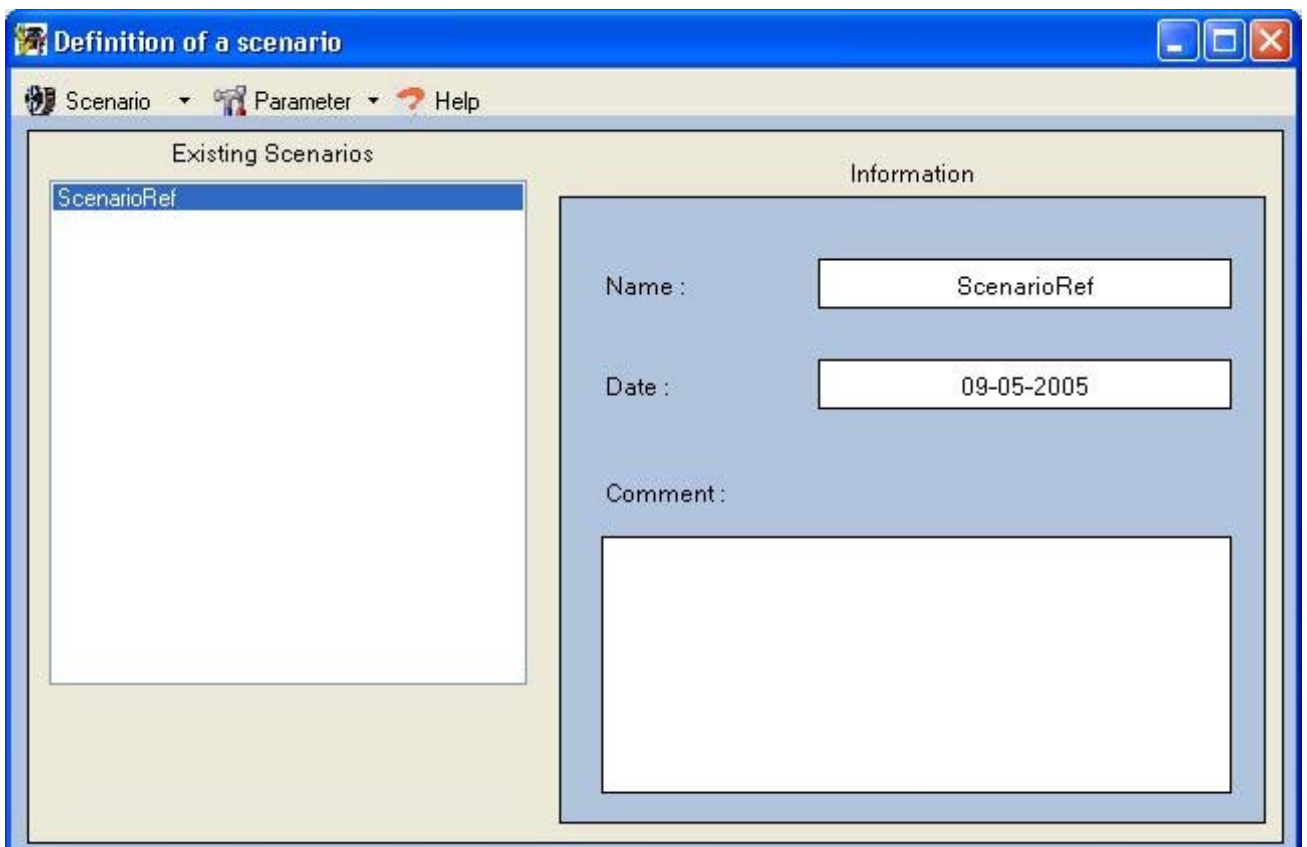
2. To delete an existing mill supply area

Select "To delete an existing mill supply area" and confirm the deletion by clicking "OK" in the following dialog box.



3. To simulate a scenario for an existing mill supply area

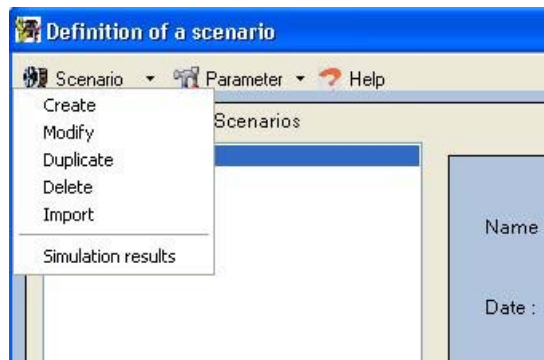
Select "To choose an existing mill supply area", then click "OK". The scenario definition window is then displayed on the screen.



B. Scenario options

1. To create or modify a scenario

From the scenario definition window, select "**Create**" or "**Modify**" in the "**Scenario**" menu.



The "**Creation/modification of a scenario**" window is displayed as follows:



The scenario name is an obligatory field. There must only be one. The scenario creation date is the current date, but it can be modified. The Comment section gives details on the scenario. It is not obligatory.

2. To duplicate a scenario

From the Scenario definition window, choose the scenario to be duplicated then select "**Duplicate**" in the "**Scenario**" menu. All of the scenario parameters are duplicated and the new scenario appears in the list. To delete a scenario

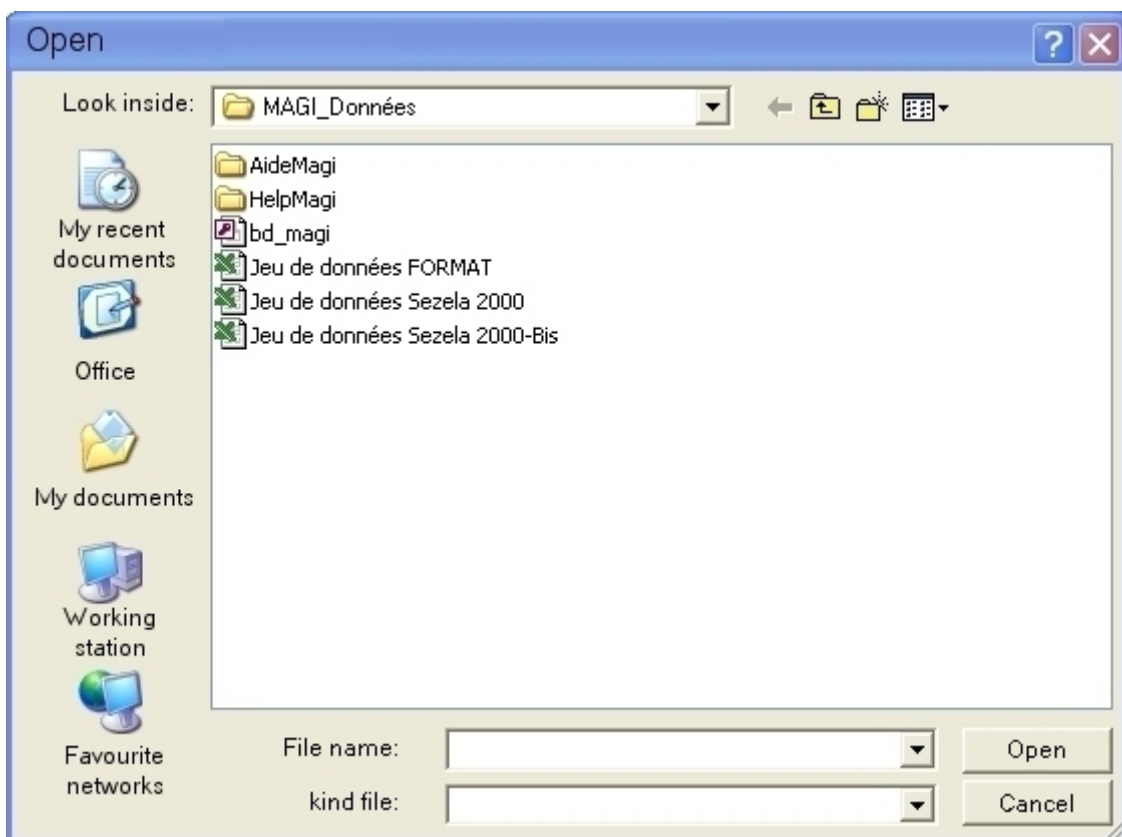
3. To delete a scenario

To delete an existing scenario, select the scenario to delete, select the **"Delete"** option in the **"Scenario"** menu, and then confirm the deletion by clicking **"OK"**.

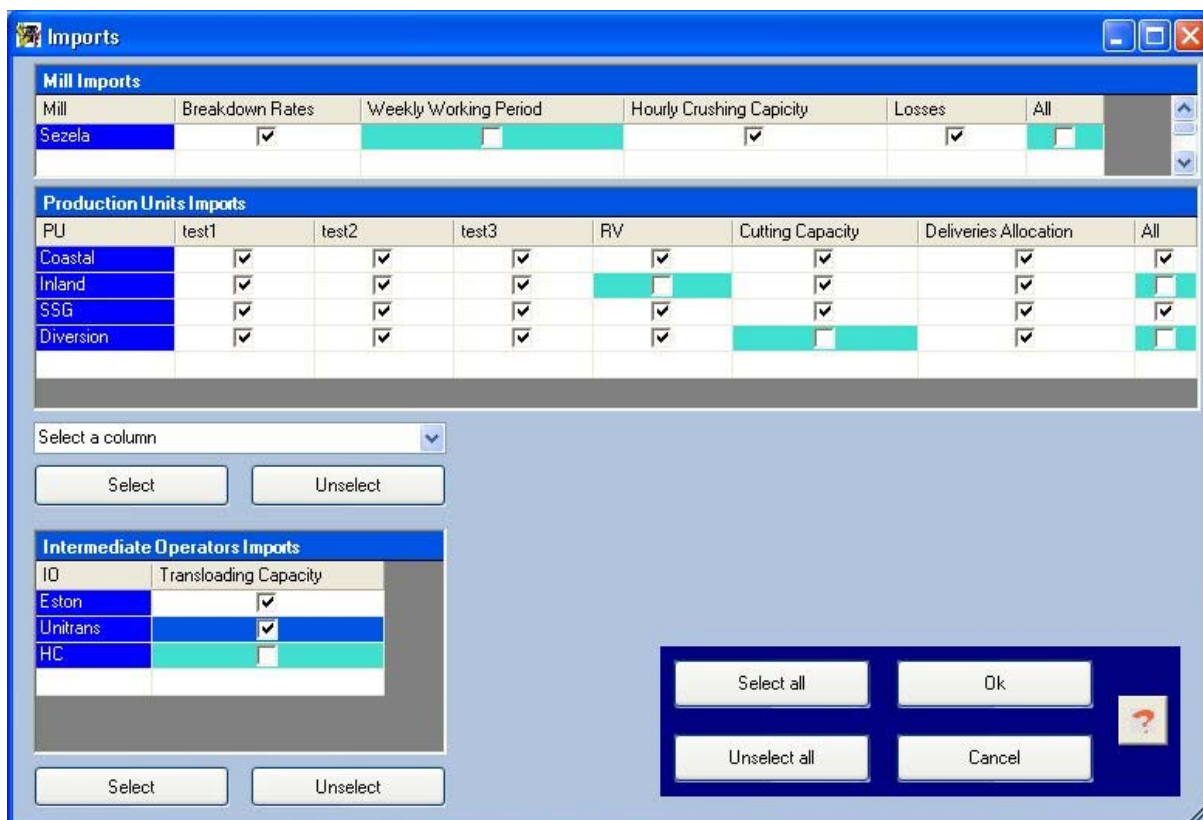


4. To import a data file in an existing scenario

From the Scenario definition window, select **"Import"** in the **"Scenario"** menu. Choose your data file and then click **"Open"**.



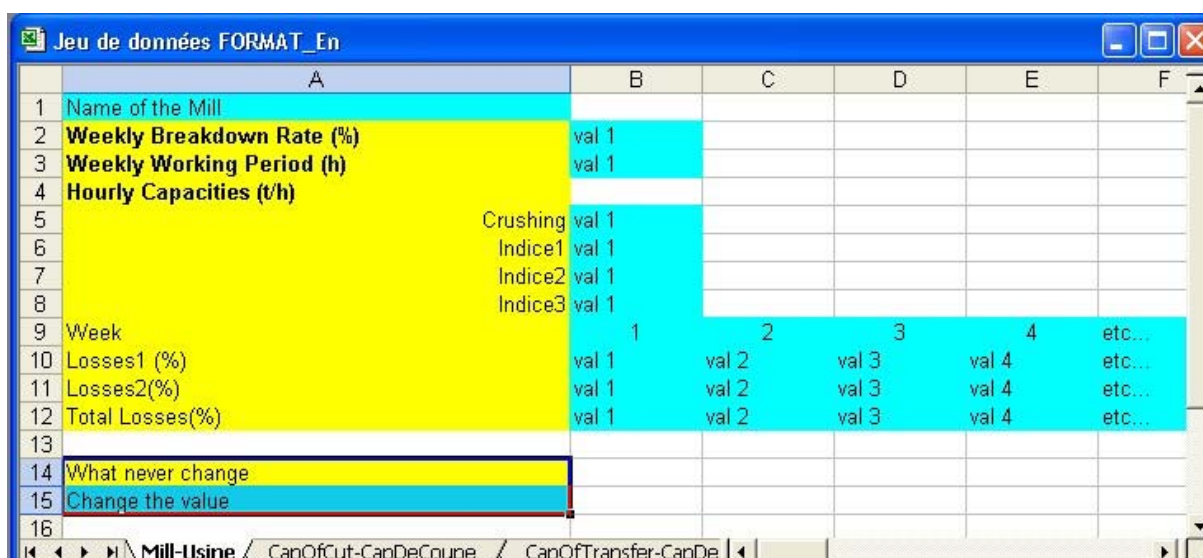
The **"Imports"** window is displayed as follows:



You can import all of the data or select only those which interest you. In the first two tables, the "All" column enables the user to deal with a whole row. In the production units table, it is also possible to deal with the columns by using the drop-down menu and one of the two buttons located just below. The two buttons under the intermediate operators table also makes it possible to deal with the column "transfer capacity". Click "OK" once your choice is made.

Data is imported from an Excel file in a preset format. The "FORMAT_En.xls" file is an example of the MAGI importation file format. It can be found in the directory "C:\Program Files\CIRAD\Magi2004". This file is presented in the form of five sheets to fill in.

a) Mill sheet



The blue cells must be filled in.

b) Cutting capacity sheet

	A	B	C	D	E	F	G	H
1	Week	1	2	3	4	5	6	etc...
2	PU1	val 1	val 2	val 3	val 4	val 5	val 6	etc...
3	PU2	val 1	val 2	val 3	val 4	val 5	val 6	etc...
4	etc...							
5								

c) Transloading capacity sheet

	A	B	C	D	E	F	G	H
1	Week	1	2	3	4	5	6	etc...
2	IO1	val 1	val 2	val 3	val 4	val 5	val 6	etc...
3	IO2	val 1	val 2	val 3	val 4	val 5	val 6	etc...
4	etc...							
5								

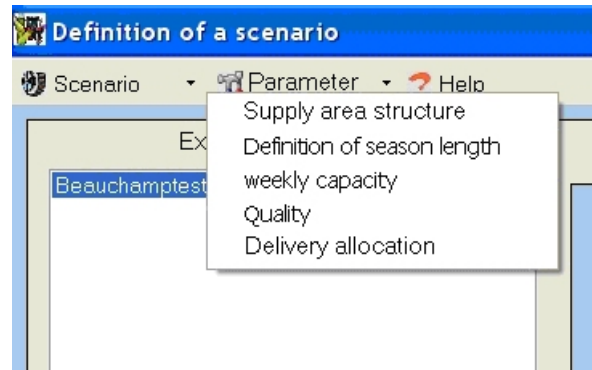
d) Quality variable sheet

	A	B	C	D	E	F	G	H
1	Week	1	2	3	4	5	6	etc...
2	PU1	val 1	val 2	val 3	val 4	val 5	val 6	etc...
3	PU2	val 1	val 2	val 3	val 4	val 5	val 6	etc...
4	etc...							
5								

e) Delivery allocation sheet

	A	B	C	D	E	F	G	H
1	Week	1	2	3	4	5	6	etc...
2	PU1	val 1	val 2	val 3	val 4	val 5	val 6	etc...
3	PU2	val 1	val 2	val 3	val 4	val 5	val 6	etc...
4	etc...							
5								

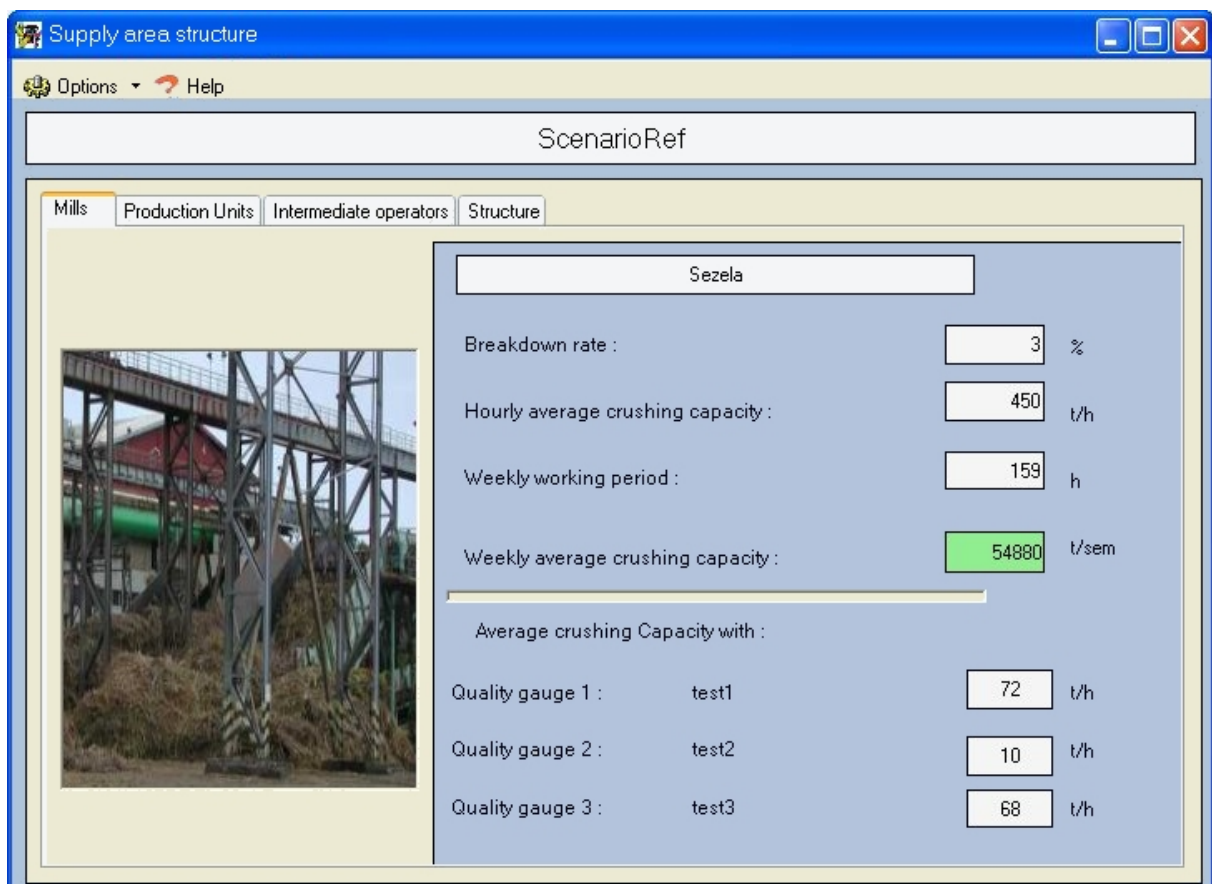
C. To parameter a scenario



1. To parameter the mill supply area structure

Select "**Supply area structure**" in the "**Parameter**" menu in the "**Scenario definition**" window.

a) Mill characteristics

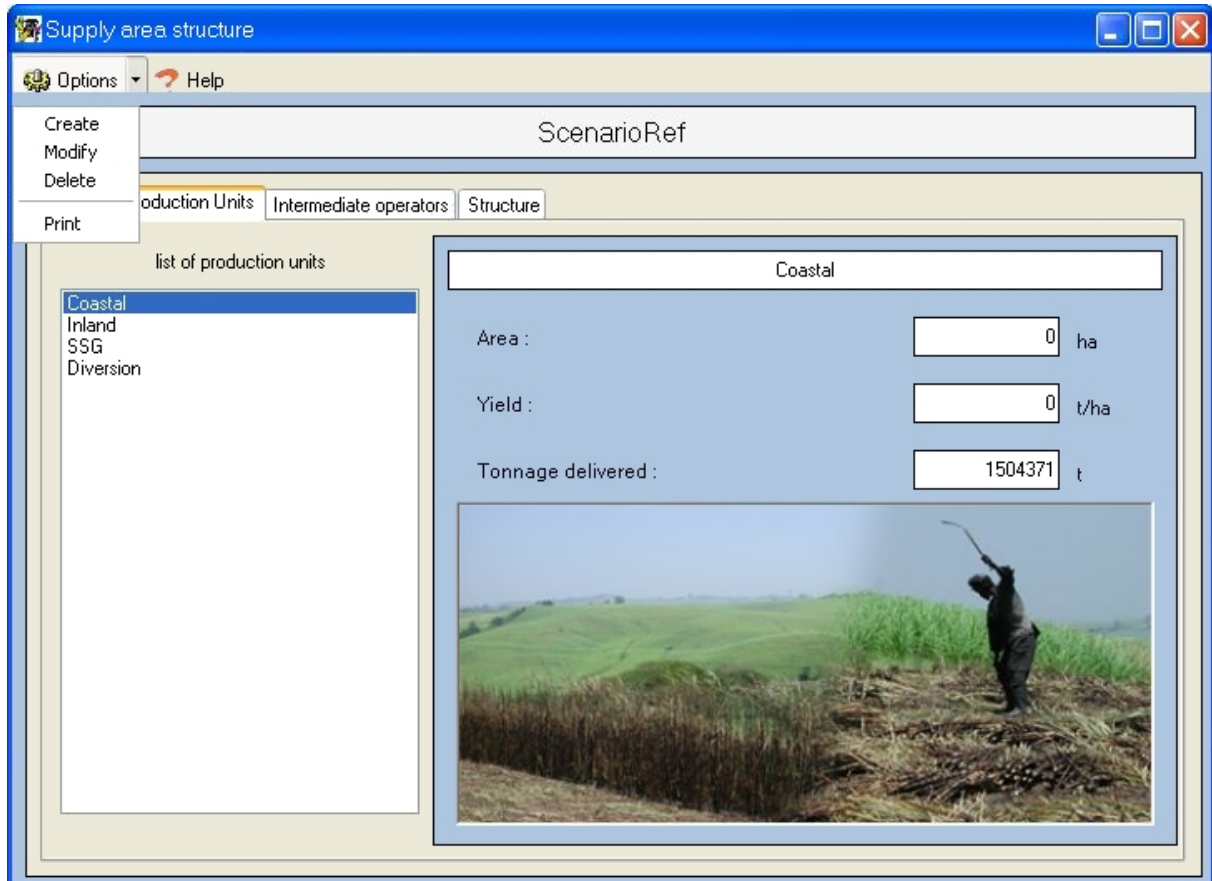


The "**Mills**" tab gives all information concerning the mill.

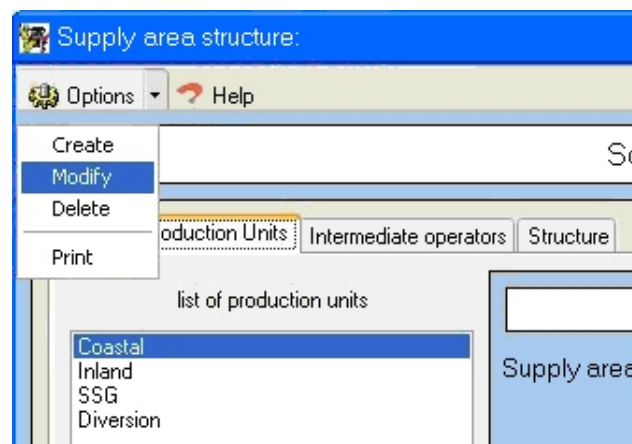
The "**Weekly average crushing capacity**" is automatically computed with the "**Weekly working period**", the "**Hourly average crushing capacity**" and the "**Breakdown rate**". Green shading means that it is a computed field that cannot be manually modified.

To modify all other variables, select "**Modify**" in the "**Options**" menu.

b) Production unit characteristics



From the "**Options**" menu, it is possible to create, modify or remove a production unit after having selected it in the list.



The following window appears:

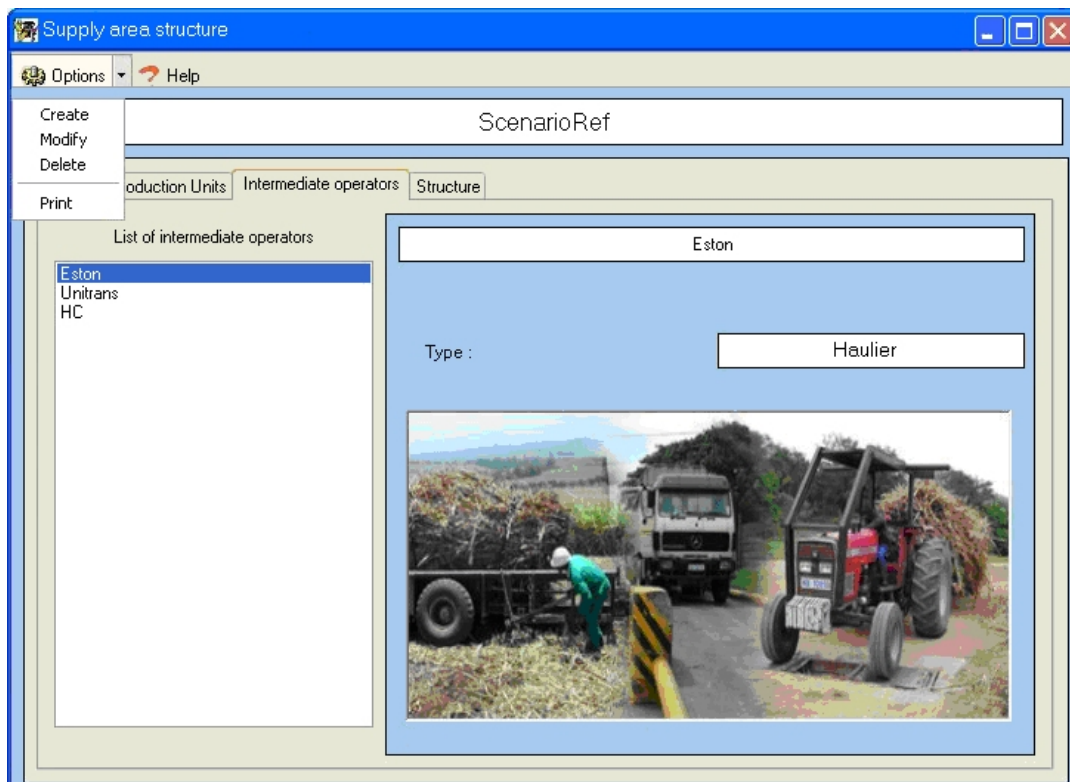


Two possible creation options:

- Choose an existing production unit in another scenario
- Enter a new name

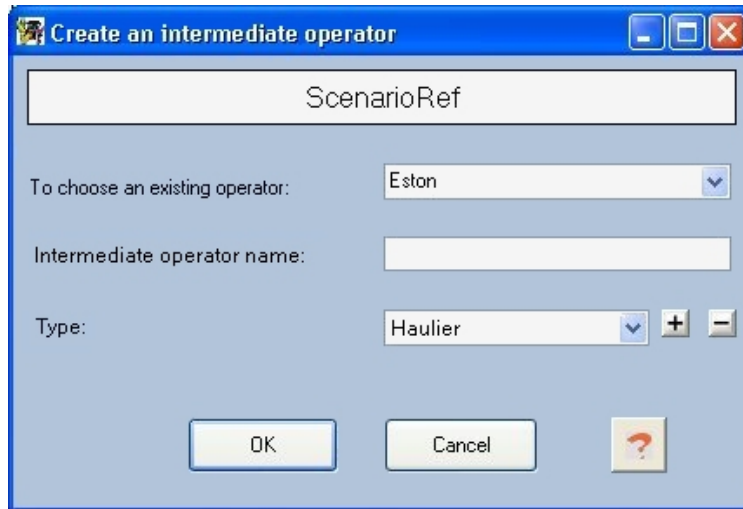
"**Delivered tonnage**" is a computed field which corresponds to the product of the area by the yield. However, it can also be entered manually by the user.

c) Intermediate operator characteristics





As mentioned concerning production units, it is possible to create, modify, or delete an intermediate operator from the "Options" menu.


The following window is displayed:



Two possible creation options:

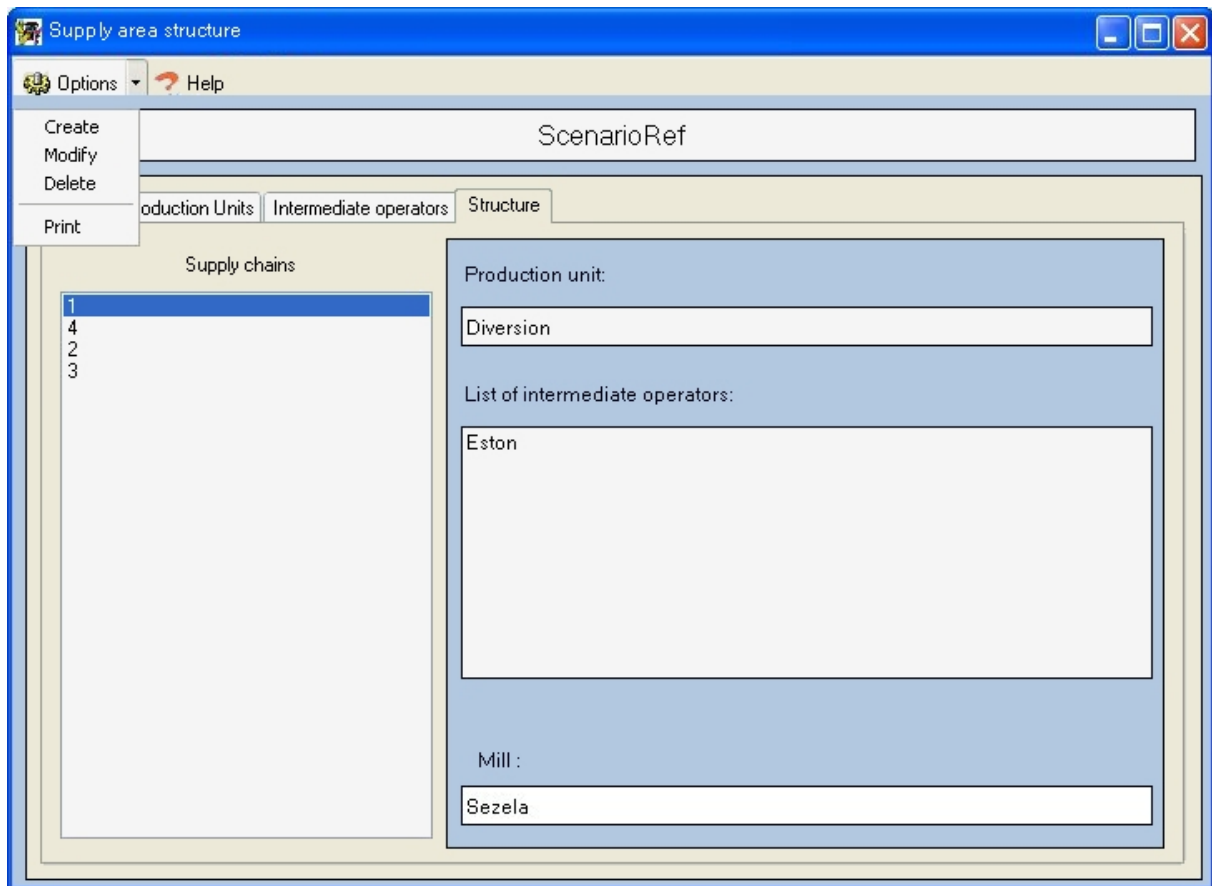
- Choose an existing intermediate operator in an existing scenario
- Enter a name and then a type

To delete a type, it should first of all be selected in the drop-down menu then click . Similarly, to add one, just click .

The  button on the right of the field validates the new type.

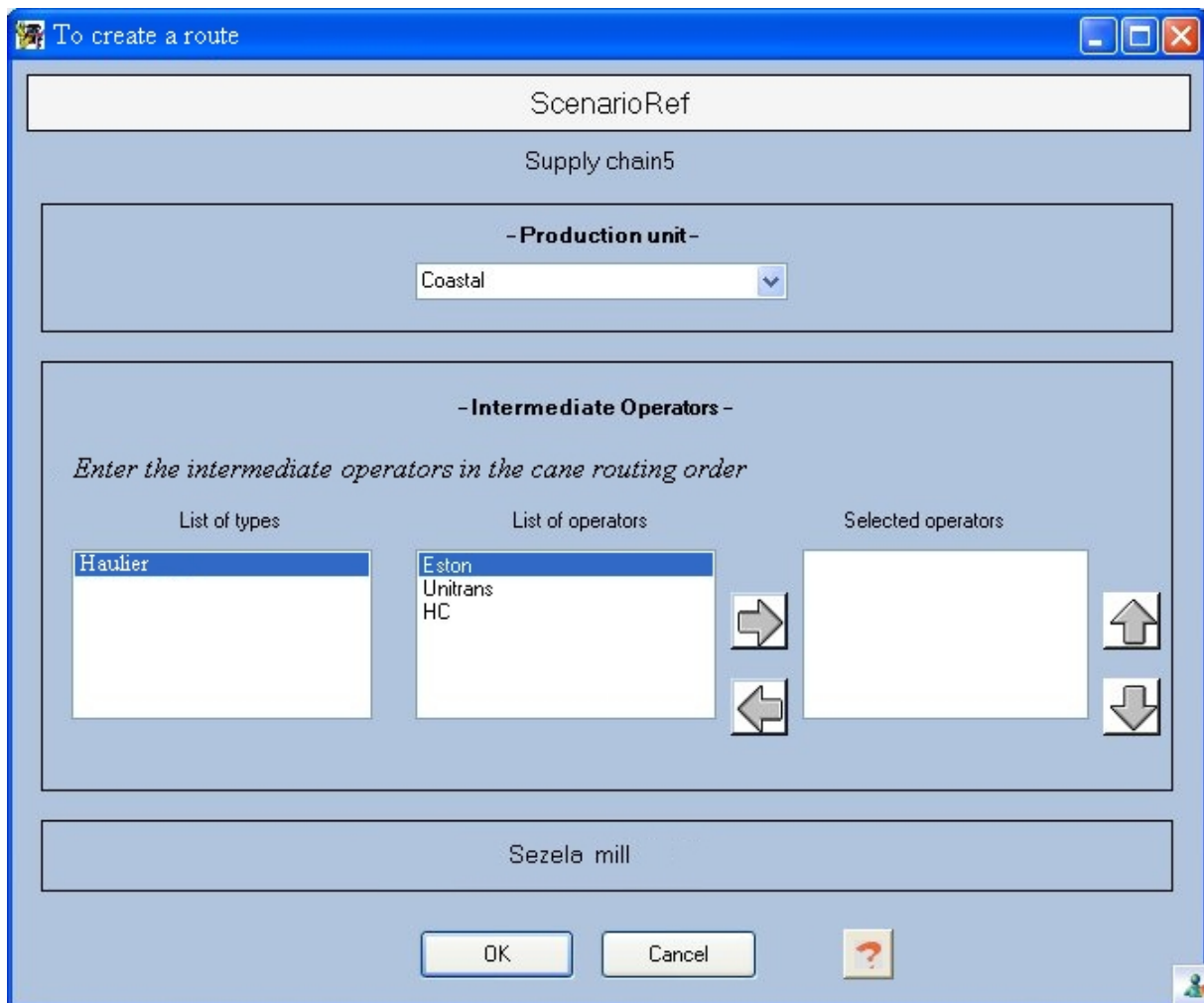
To register the current operator, click  at the bottom of the form.



d) Routes



As mentioned concerning production units, it is possible to create, modify, or delete a route from the "**Options**" menu.

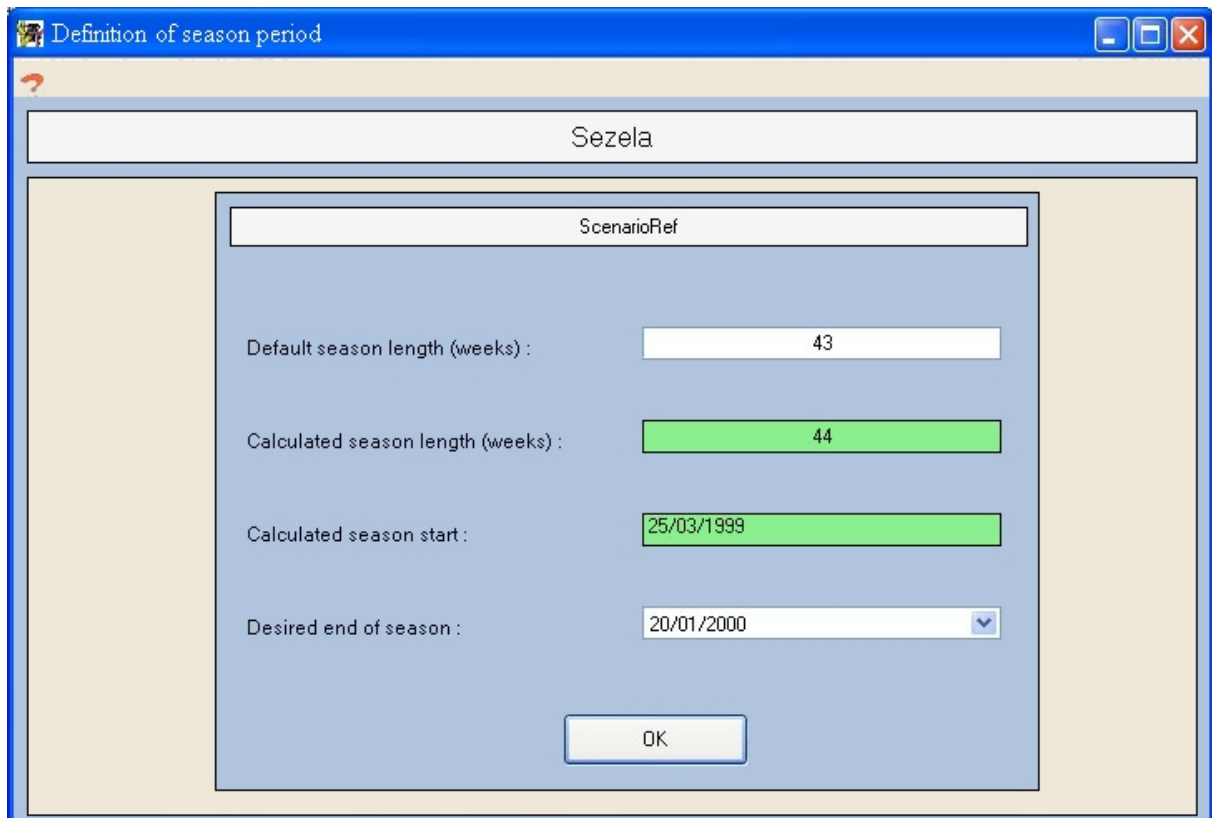
The following window is displayed:



To create a route, select a production unit in the drop-down menu (there can only be one route per production unit). Then select an intermediate operator in the list of the operators (the first list located on the left makes it possible to filter the intermediate operators by type). The  button is used to transfer the selected operator to the final list. This is process carried out for each operator while strictly respecting the cane routing order. An operator can be deleted by clicking the  button while having previously selected it in the list of selected operators.

2. To parameter the season period

Select "**Definition of season period**" in the "**Parameter**" menu in the "**Scenario definition**" window.



The green "season length" and "season start" fields are calculated fields:

- The determination of the season period (in weeks) takes into account the total tonnage of cane to be milled in the season, as estimated by growers, and the average weekly milling capacity of the sugar refinery, estimated by the millers:

$$Dc \cong \frac{\sum_{i=1}^n Tg_i}{Cbhm}$$

Where,

Tg: delivered tonnage of PU i

Cbhm: average weekly crushing capacity of the mill

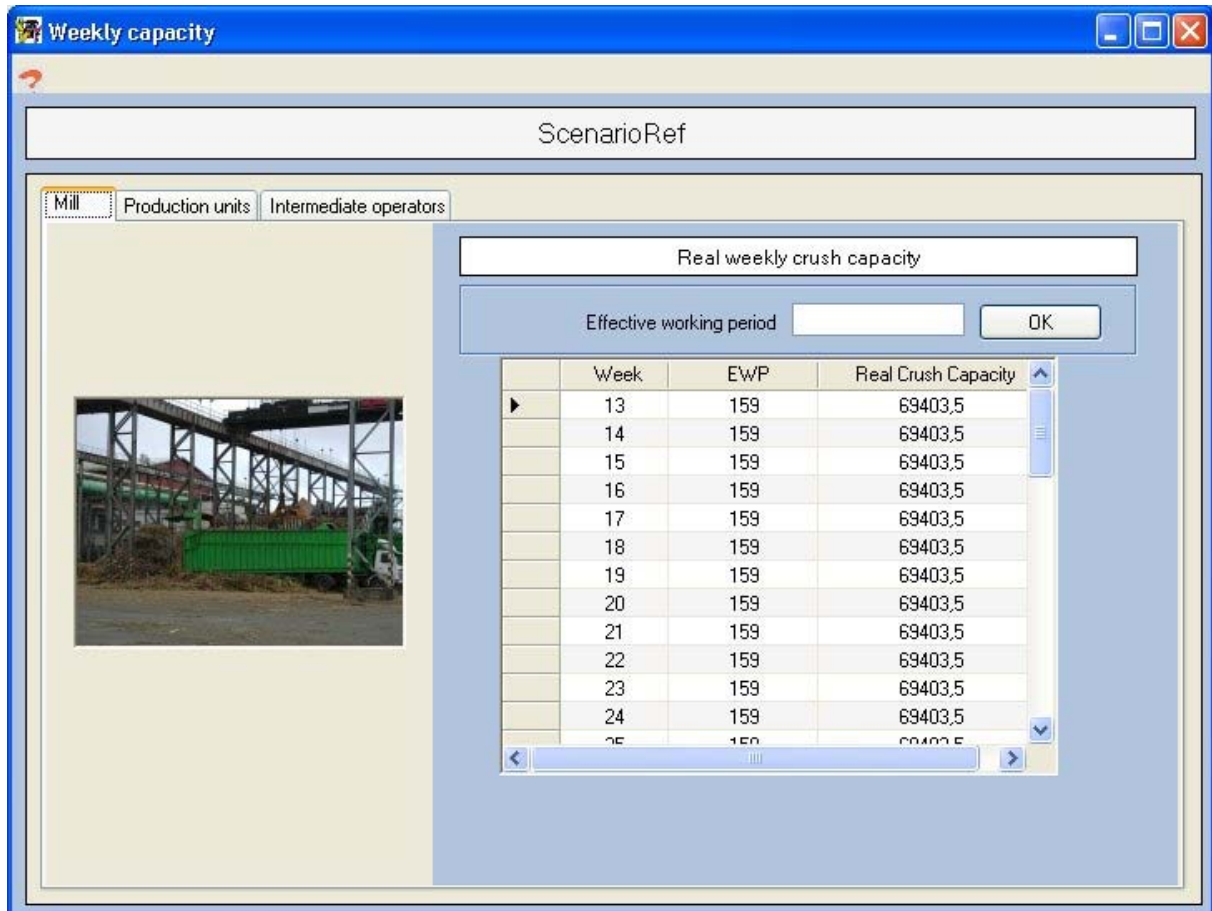
n: number of PUs

- The season start is calculated from the length of the season period and the season ending date.

Magi takes the first "Season period" field into account for the calculation of weekly flows. Its default value corresponds to the computed value. However, it is possible to modify its theoretical value to determine the exact time of the season period.

3. To parameter weekly capacities

Select "Weekly capacity" in the "Parameter" menu in the "Scenario definition" window.



In the "Mill" tab, the real weekly crushing capacity is calculated from the effective working period (EWP).

The weekly working period of the mill is calculated in two times. Initially, we calculate a working period without breakdowns according to the following general formula:

$$\text{DFHP} = 168\text{h} - \text{maintenance time} - \text{planned breakdowns (closing for leave, etc.)}$$

Then we calculate the effective working period after integration of an average breakdown rate:

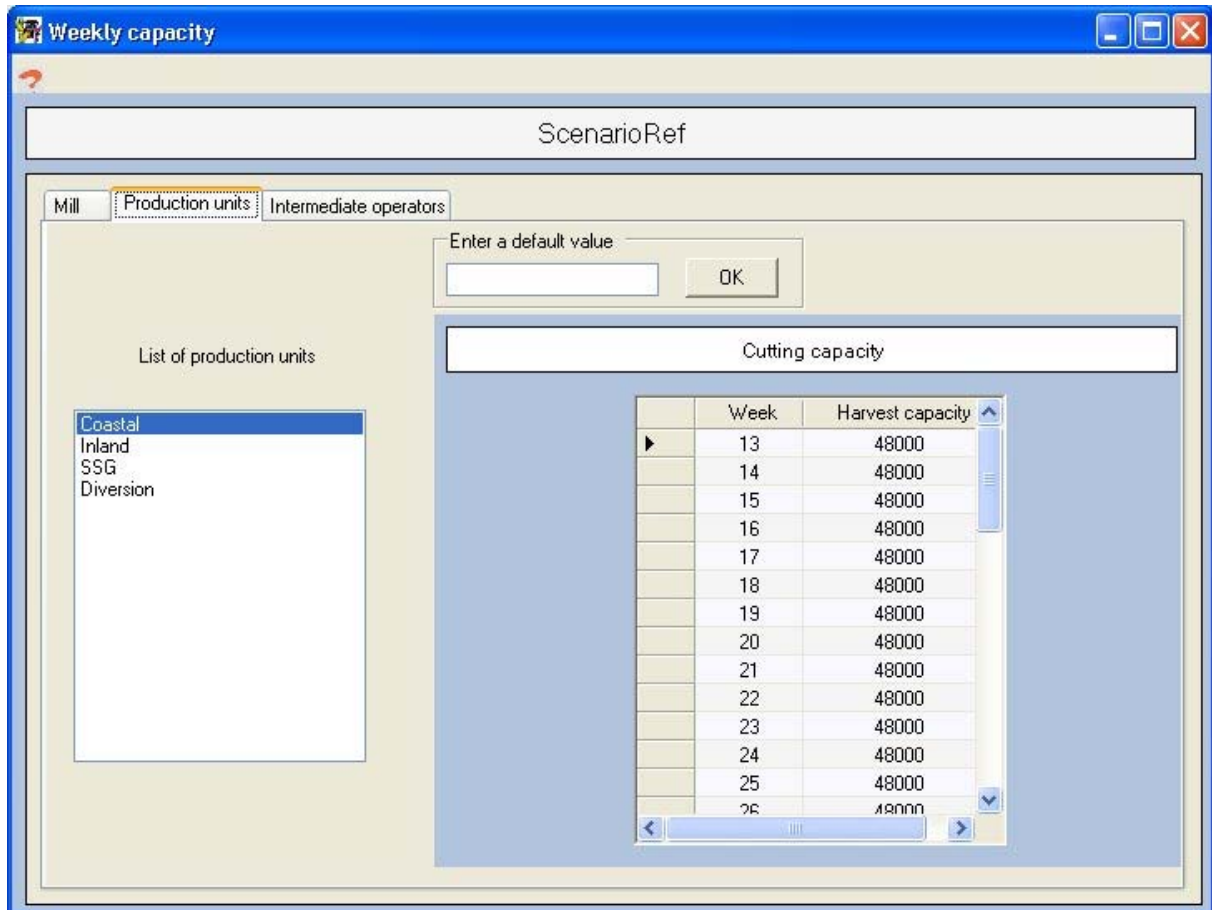
$$\text{EWP} = \text{DFHP} * (1 - \text{breakdown rate})$$

For each week S, the weekly capacity of the mill is given by the following formula:

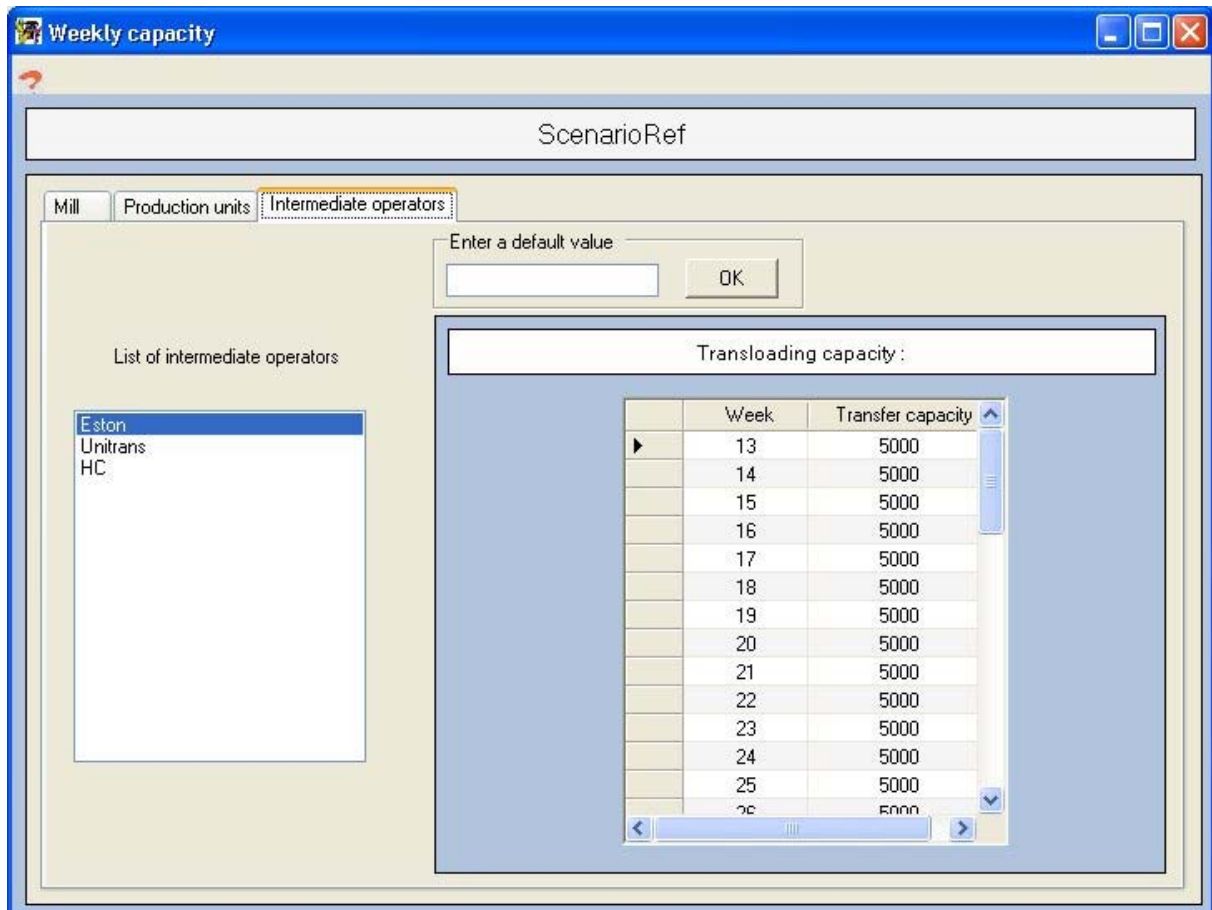
$$\text{Weekly capacity} = (168 - \text{weekly maintenance time}) * (1 - \text{breakdown rate}) * \text{hourly capacity}$$

Note that the hourly capacity of the mill, when it varies, is calculated from an objective extraction rate and quality of the cane that enters the mill, according to a yet to be determined formula.

A default EWP value can be entered and can be allocated for each week of the season period by clicking "OK". It is also possible to modify the EWP values individually for each week.



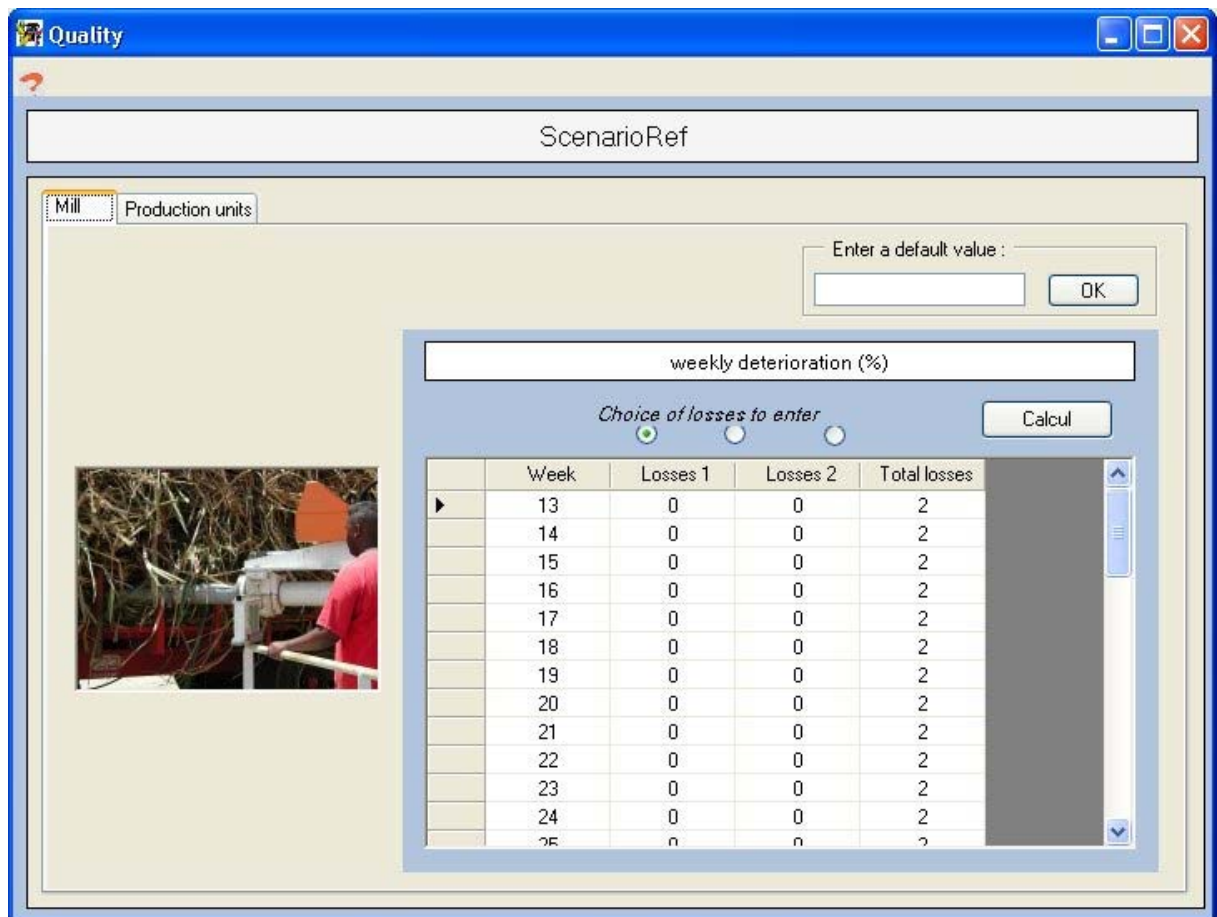
In the "PU" tab, as noted previously, a default cutting capacity value can be given per week to the PU selected in the list. Moreover, a cutting capacity can be modified manually for a given week.



In the **"Intermediate operators"** tab, the transfer capacity can be entered as explained previously, i.e. by giving a default value or by a manual entry for a week given.

4. To parameter quality

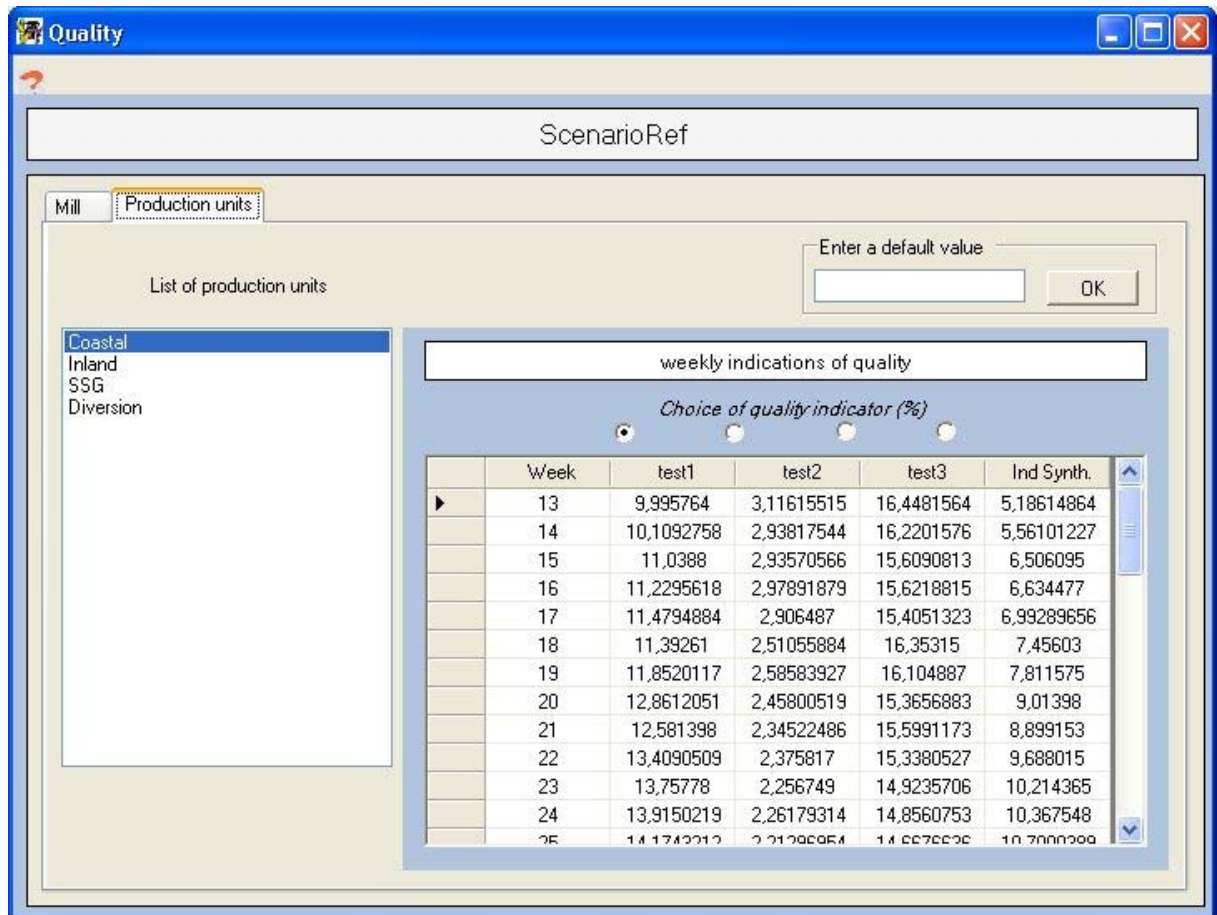
Select **"Quality"** in the **"Parameter"** menu in the **"Scenario definition"** window.



The "Mill" tab concerns weekly sugar losses.

In "Reunion", "Losses 1" relate to the technical difference between the sample obtained at the weigh scales and that obtained at the mill entrance. "Losses 2" represent the losses due to the milling process. Total losses are calculated automatically as the sum of "Losses 1" and "Losses 2" for one week by clicking "Calculation".

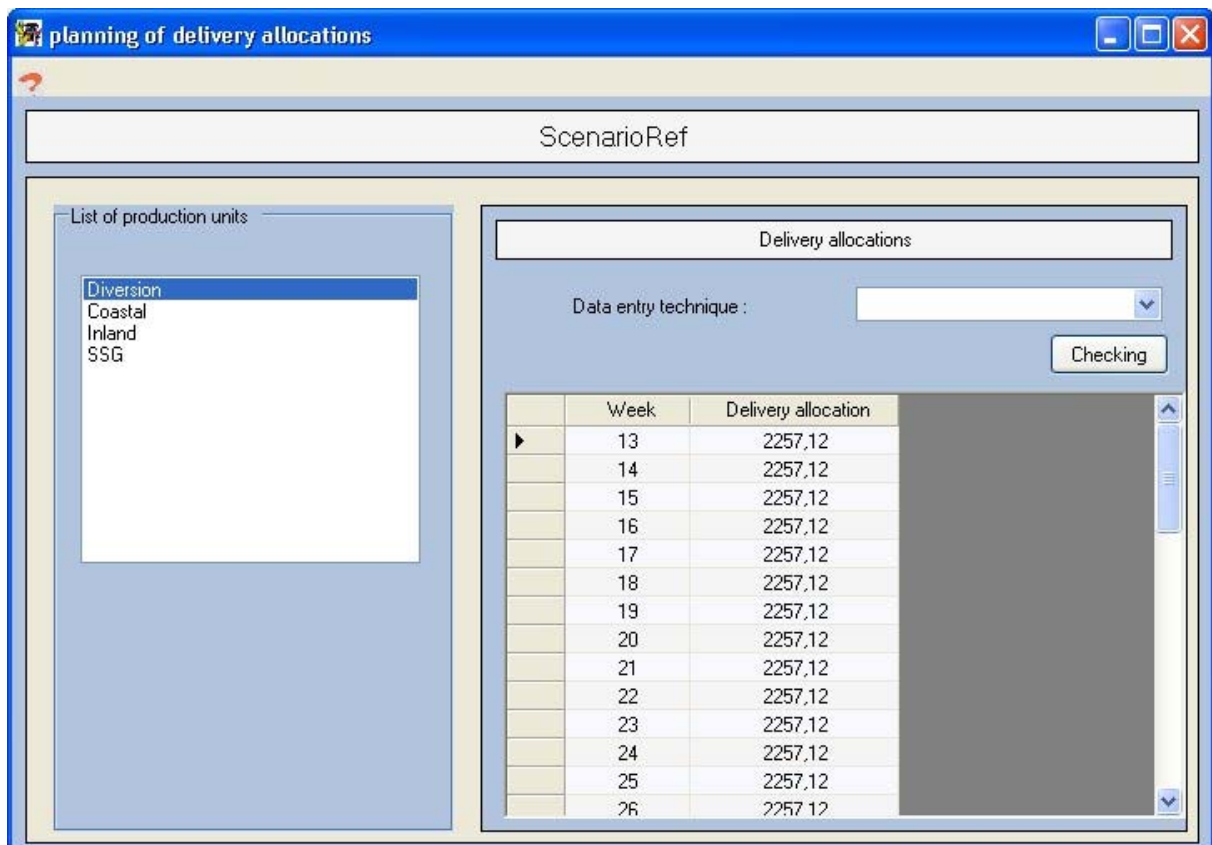
In "South Africa", there is no sampling done outside of the mill, so total losses can thus be entered directly by entering a default value if the losses do not vary throughout the season period, or by manually entering the values for each week.



The second "Production units" tab relates to the cane quality variables. The columns "Ind1", "Ind2", "Ind3" correspond to weekly quality index values entered in the "Mill" tab on the mill supply area structure definition level. The synthetic indicator corresponds to the sugar content of the cane. A default value can be entered as a specific value for a given week.

5. To parameter delivery allocations

Select "Delivery allocations" in the "Parameter" menu in the "Scenario definition" window.

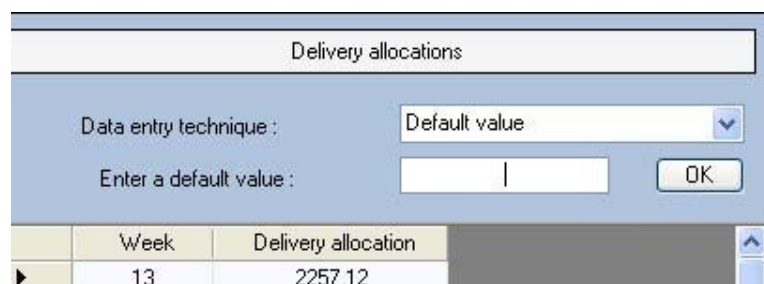


Magi proposes various delivery allocation calculation methods.

a) Manual input

Delivery allocations are entered individually for each week of the season. A check procedure verifies that potential flows of the successive supply chain links are not exceeded.

b) Default value



A default value may also be entered and assigned to every week of the season.

c) Uniform throughout the season

The "**Uniform throughout the season**" option is selected to obtain an identical maximum value for each week of the season.

$$DA = \text{Total Tonnage PU} / \text{Season period}$$

In this case, the two constraints "**Delivery of total PU tonnage**" and "**Weekly mill capacity not exceeded**" are usually automatically taken into account.

d) Uniform throughout periods

Delivery periods during the season period in which delivery allocations are constant may also be determined: The objective in this case is to ask each PU to deliver over a certain period, according to a uniform weekly delivery allocation. For every PU, it is thus necessary to determine the week of the beginning and end of delivery during the season period and to calculate the weekly delivery allocations according to the following formula:

$$DA = \text{PU Total Tonnage} / \text{PU Delivery period}$$

$$\text{PU Delivery Period (weeks)} = \text{week of end of delivery} - \text{week of beginning of delivery} + 1$$

The "**Total PU tonnage delivery**" constraint is automatically taken into account. It is essential that the calculated delivery allocation does not exceed the harvest capacity of the production unit considered; otherwise an error message will be displayed. The user must then extend this delivery period so as to remain under the harvest capacity.

The "**Weekly mill capacity not exceeded**" constraint must be checked once all the delivery allocations are defined. For certain weeks, the sum of the PU deliveries may exceed this capacity. When exiting a scenario, a listing of these weeks is thus displayed, with the percentage exceeding the capacity calculated according to the formula:

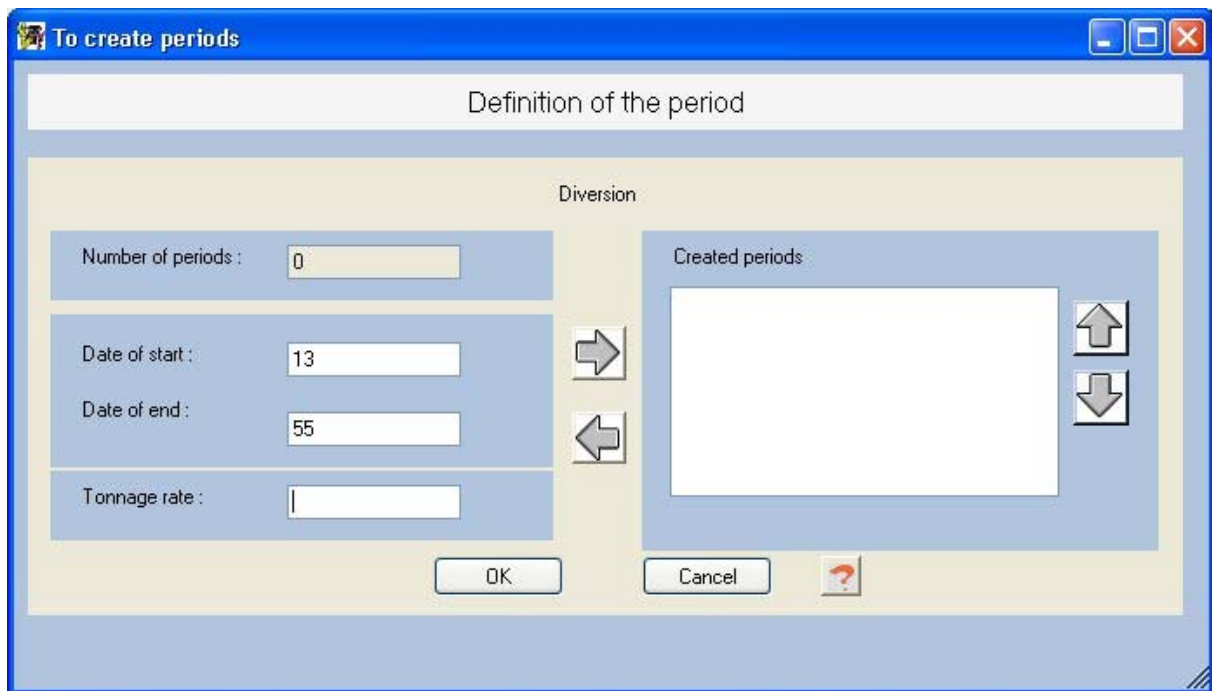
$$Dh_j = 100 \times \sum_{i=1}^n \frac{L_{ij}}{Cbh_j}$$

Where,

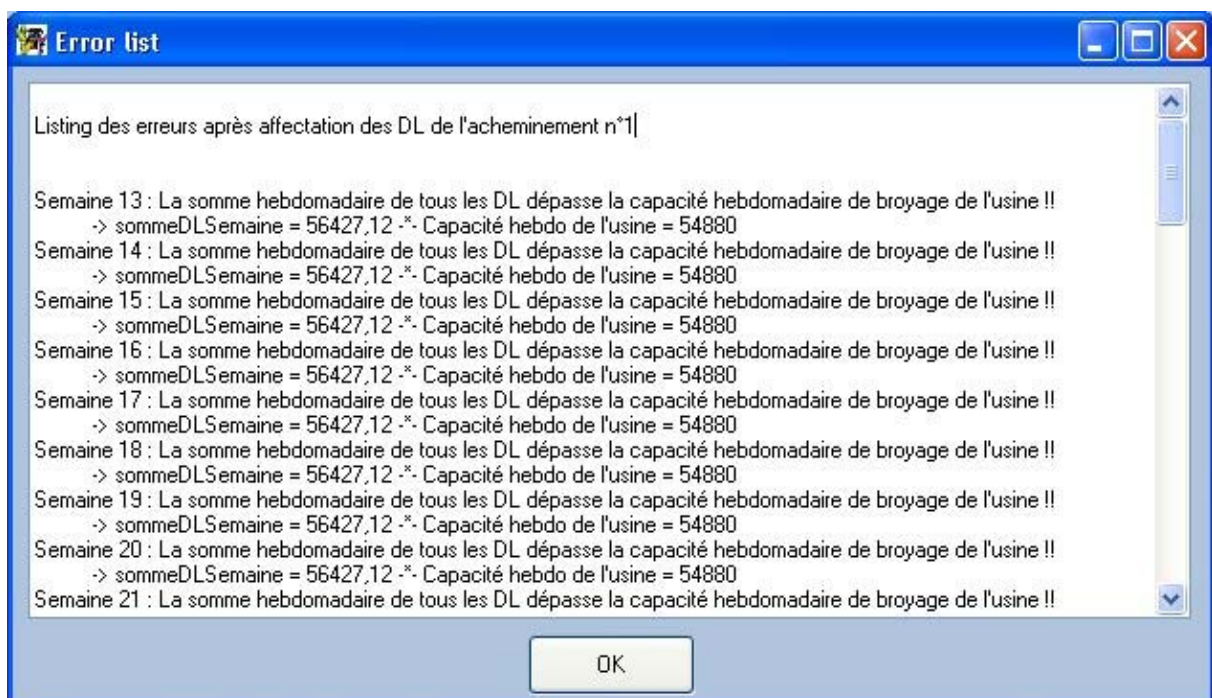
L_{ij} : deliveries of PU i in week j

Cbh_j : weekly mill crushing capacity in week j

The period creation window is displayed as follows:

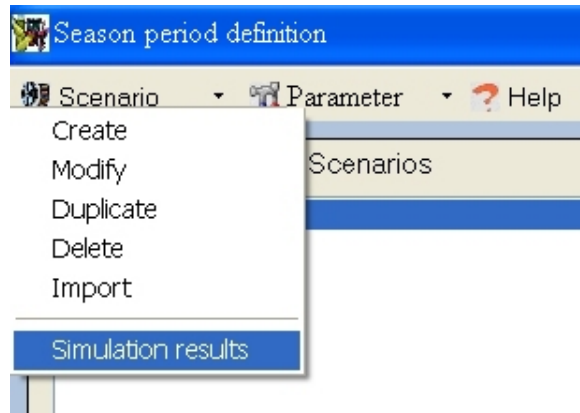


A beginning week and an ending week along with a tonnage rate (in %) are entered, and then the period is entered by clicking . To delete a period, select it and then click . The number of periods is calculated automatically. In this case, the delivery allocations will be the same for each week of the period and proportional to the tonnage rate. Click and to scroll down the list of created periods. Once the periods are defined, validate them by clicking "OK". When certain constraints are not respected, a summary listing is displayed with an explanation on each value exceeded per week. The following is an example:



D. Obtaining scenario simulation results

From the Scenario definition window, select "Simulation results" in the "Scenario" menu.



The window includes five tabs:

1. Deliveries

The screenshot shows the "Simulation results" window. The title bar includes "Options" and "Help" menus. Below the title bar is a text field labeled "ScenarioRef". The main content area has five tabs: "Delivery allocations", "Capacities", "Quality", "Loading rate", and "Sugar production". The "Delivery allocations" tab is active, displaying a table with the following data:

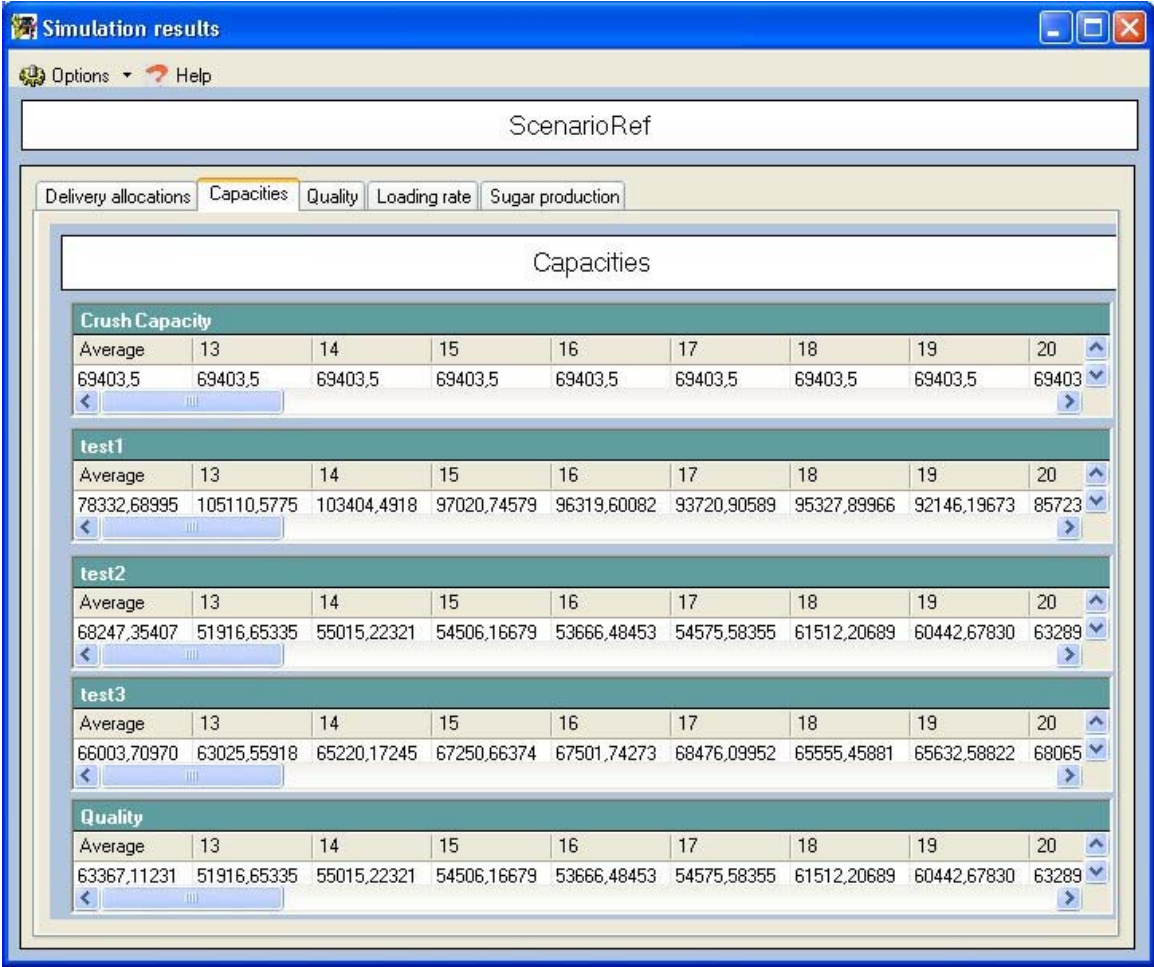
Delivery allocations								
PU - > Mill								
PU	Total	13	14	15	16	17	18	19
Coastal	1504370,957	34985,37	34985,37	34985,37	34985,37	34985,37	34985,37	34985,37
Diversion	97056,16503	2257,12	2257,12	2257,12	2257,12	2257,12	2257,12	2257,12
Inland	533808,8867	12414,16	12414,16	12414,16	12414,16	12414,16	12414,16	12414,16
SSG	291168,9150	6771,37	6771,37	6771,37	6771,37	6771,37	6771,37	6771,37
Total	2426404,923	56428,02	56428,02	56428,02	56428,02	56428,02	56428,02	56428,02

ID - > Mill								
ID	Total	13	14	15	16	17	18	19
Eston	97056,16503	2257,12	2257,12	2257,12	2257,12	2257,12	2257,12	2257,12
HC	291168,9150	6771,37	6771,37	6771,37	6771,37	6771,37	6771,37	6771,37
Unitrans	2038179,843	47399,53	47399,53	47399,53	47399,53	47399,53	47399,53	47399,53
Total	2426404,923	56428,02	56428,02	56428,02	56428,02	56428,02	56428,02	56428,02

The first table (PU->mill) represents the weekly cane deliveries of each production unit with the total and the remainder to be delivered (total produced - total delivered) given in second and last column. The last row represents the total for all units.

The second table (IO->mill) represents weekly cane flows of each intermediate operator with the total given in the second column and the total for all intermediate operators given in the last row.

2. Capacities



This tab represents the weekly mill capacities. The first table gives the crushing capacity; the three following tables give the calculated weekly capacities relative to the three quality variables, while the last gives the minima of the three previous values. The average is given in the first column of each table. The crushing capacity is the same for the entire season period (cf. capacity calculated on the mill screen).

The weekly capacities related to indices 1, 2 and 3 are calculated as follows:

First step: calculation of the weekly average quality values for the mill supply area for week j and index K (Qu_{kj}):

$$Qu_{kj} = \frac{\sum_{i=1}^m Q_{kij} \times L_{ij}}{\sum_{i=1}^m L_{ij}}$$

Where

k: 1, 2, 3

m: number of PUs

QU_{kj} : weighted average of the quality of index k in week j

Q_{kij} : value of the quality of index k for PU i in week j

L_{ij} : delivery of PU i for week j

(Q_{kij} were entered in the Quality module)

2nd step: calculation of the weekly capacities for week j and index k (Che_{kj}) relative to the three quality variables (and corresponding to the three lines of the table: Indices 1, 2 and 3)

$$Che_{kj} = \frac{Dfe_j \times (100 - Txp) \times Cho_k}{Qu_{kj}}$$

Where

Def_j : the effective mill working period for week j

(value obtained from the "Weekly mill capacity" module)

Txp : breakdown rate in % (e.g. 3.6%) (value obtained from the "Mill" module)

Cho_k : hourly capacity for the quality variable of index k (t/h)

(value obtained from the "Mill" module)

Qu_{kj} : weighted averages for the quality variable of index k in week j

Third step: calculation of the weekly capacities minima for week j

$$Che_j = \min(Che_{1j}, Che_{2j}, Che_{3j}) \text{ or } Che_j = \min_{k=1,2,3}(Che_{kj})$$

3. Quality

Simulation results

Options Help

ScenarioRef

Delivery allocations Capacities **Quality** Loading rate Sugar production

Cane quality

Indicateur Synthétique								
PU	13	14	15	16	17	18	19	20
Coastal	5,186149	5,561012	6,506095	6,634477	6,992897	7,45603	7,811575	9,013E

test1								
PU	13	14	15	16	17	18	19	20
Coastal	9,995764	10,10928	11,0388	11,22956	11,47949	11,39261	11,85201	12,861

test2								
PU	13	14	15	16	17	18	19	20
Coastal	3,116155	2,938175	2,935706	2,978919	2,906487	2,510559	2,585839	2,458E

test3								
PU	13	14	15	16	17	18	19	20
Coastal	16,44816	16,22016	15,60908	15,62188	15,40513	16,35315	16,10489	15,36E

Mill								
indicateur	Moyenne	13	14	15	16	17	18	19
Indicateur Sv	10,77780860	5,955693538	6,377351286	7,092548696	7,062133324	7,472960644	7,727594581	8,063E

The first four tables of this tab represent a weekly summary of the quality variables for each production unit. The last column gives the weighted average for the season. The fifth table represents the quality of the mill supply area.

Data from the Quality module are used for the qualities per PU and week, without further calculation. The seasonal average per PU is calculated by weighting the weekly quality values by their effective deliveries

$$Q_i = \sum_{j=1}^n Q_{ij} \times L_{ij} \div \sum_{j=1}^n L_{ij}$$

Where

- Q_i : weighted average quality of PU i for the season
- Q_{ij} : quality of PU i in week j
- L_{ij} : deliveries of PU i in week j

The average weighted qualities per delivery for the mill supply area for week j (QU_j) are calculated by the following formula:

$$QU_j = \sum_{i=1}^m Q_{ij} \times L_{ij} \div \sum_{i=1}^m L_{ij}$$

Where

- Q_{ij} : quality of PU i in week j
- L_{ij} : deliveries of PU i in week j

And the average weighted qualities per delivery are thus obtained for the mill supply area and for the entire season (QU).

$$QU = \sum_{i=1}^m \sum_{j=1}^n Q_{ij} \times L_{ij} \div \sum_{i=1}^m \sum_{j=1}^n L_{ij}$$

Where

- Q_{ij} : quality of PU i in week j
- L_{ij} : deliveries of PU i in week j
- n : number of weeks
- m : number of PUs

4. Loading rates

The screenshot shows a software window titled "Simulation results" with a menu bar containing "Options" and "Help". The main content area is titled "ScenarioRef" and contains several tabs: "Delivery allocations", "Capacities", "Quality", "Loading rate", and "Sugar production". The "Loading rate" tab is active, displaying a table with the following data:

PU	Average	13	14	15	16	17	18	19
Coastal	72,88618977	72,88618977	72,88618977	72,88618977	72,88618977	72,88618977	72,88618977	72,88618977
Diversion	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234
Inland	65,33768503	65,33768503	65,33768503	65,33768503	65,33768503	65,33768503	65,33768503	65,33768503
SSG	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646

ID	Average	13	14	15	16	17	18	19
Eston	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234	45,14240234
HC	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646	84,64212646
Unitrans	67,71361607	67,71361607	67,71361607	67,71361607	67,71361607	67,71361607	67,71361607	67,71361607

Crushing	Average	13	14	15	16	17	18	19
Sezela	81,30429075	81,30429075	81,30429075	81,30429075	81,30429075	81,30429075	81,30429075	81,30429075

Quality	Average	13	14	15	16	17	18	19
Sezela	89,56586659	108,6896396	108,6896396	108,6896396	108,6896396	108,6896396	108,6896396	108,6896396

The first table represents the loading rates of the production units with the arithmetic average for the season given in the second column. The second table represents the loading rates of the intermediate operators. The third table represents the loading rate for the mill crushing capacity, and the last table represents the loading rate for the quality.

The loading rates are calculated by dividing the quantities collected, transferred or milled by the capacities calculated by type of operator. They are expressed in % (e.g. 95%):

$$\tau_{up_{ij}} = \frac{100 \times L_{ij}}{Cr_i}$$

Where

L_{ij} : delivery of PU i in week j
 Cr_i : harvest capacity of PU i

$$\tau_{oi_{ij}} = \frac{100 \times T_{ij}}{Ct_i}$$

Where

T_{ij} : cane quantity transferred from IO p in week j
 Ct_i : transfer capacity of IO p

$$\tau_{u_j} = \frac{100 \times Lu_j}{Cbh_j}$$

Where

Lu_j : cane quantity delivered to the mill in week j
 Cbh_j : mill crushing capacity in week j

$$\tau_{q_j} = \frac{100 \times Lu_j}{Che_j}$$

where

Lu_j : cane quantity delivered to the mill in week j
 Che_j : mill crushing capacity relative to the quality in week j

5. Sugar production

The screenshot shows the 'Simulation results' window with the 'Sugar production' tab selected. The main table displays weekly production data for different production units (PU) from week 13 to 19. The total production for all units is 4550,2550. Below this, a smaller table shows the mill production for 'Sezela' with a total of 4459,2. A dropdown menu for 'Choice of mill production calculation' is set to 'Afrique du Sud'.

PU	Total	13	14	15	16	17	18	19
Coastal	160674,1101	1814,393281	1945,540781	2276,181406	2321,096406	2446,490781	2608,519687	2732,9084
Diversion	10365,02934	159,1075683	157,8876464	144,3253710	152,2182812	162,9204003	153,8338867	176,90509
Inland	59782,3425	998,6285156	1090,640546	1134,489687	1085,108046	1146,928671	1122,199843	1154,0500
SSG	30691,79664	388,5506640	404,5441796	447,1884375	426,599375	460,5039843	475,9753125	486,39144
Total	261513,2786	3360,680029	3598,613154	4002,184902	3985,022109	4216,843837	4360,528730	4550,2550

Mill	Total	13	14	15	16	17	18	19
Sezela	256283,0130	3293,466428	3526,640891	3922,141204	3905,321667	4132,506961	4273,318155	4459,2

This tab is divided into two tables. The first represents the weekly sugar production of each production unit, with the total for the season period given in the second column. The last row gives the total for all production units.

The second table represents the mill production with the total given in the second column. A drop-down menu makes it possible to select a method for calculating this production, which differs for Reunion and South Africa.

Sugar production calculation:

In the Reunion case, the sugar content corresponds to the total quantity of sugar contained in the cane and the technical variation represents losses due to cane quality as well as losses due to the efficiency of the extraction process, thus giving the following sugar production formula:

$$\text{ProdTot} = \sum_{s=1}^S \left[\sum_{i=1}^m D_{i,s} \times (Q_{i,s} - P_{u,s}) \right]$$

Where

$s = 1, \dots, S$ season weeks

$P_{u,s}$: total mill losses in s

$D_{i,s}$: delivery allocation of PU i in week s

$Q_{i,s}$: quality for PU i in week s

In the South African case, the technical variation concerns only losses due to the efficiency of the extraction process. The sugar content corresponds to the potentially extractable quantity of sugar for a given cane quality (%RV). The weekly sugar production is calculated according to the following formula:

$$\text{ProdTot} = \sum_{s=1}^S \left[(1 - Pu_s) \sum_{i=1}^m Dl_{is} \times Q_{is} \right]$$

Where

$s = 1, \dots, S$ season weeks

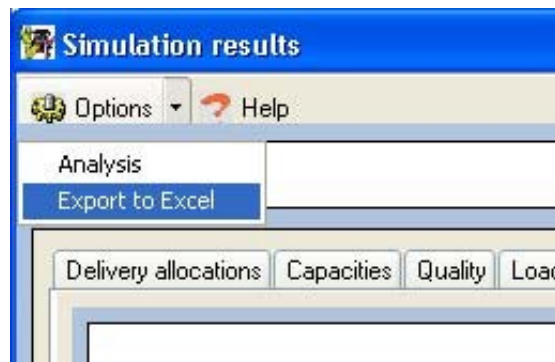
Pu_s : Total mill losses in week s

Dl_{is} : delivery allocation of PU i in week s

Q_{is} : quality for PU i in week s

6. Exporting the results to an Excel 2002 file

The results can be exported to an Excel file by selecting "**Export to Excel**" in the "**Options**" menu in the "**Simulation results**" window.

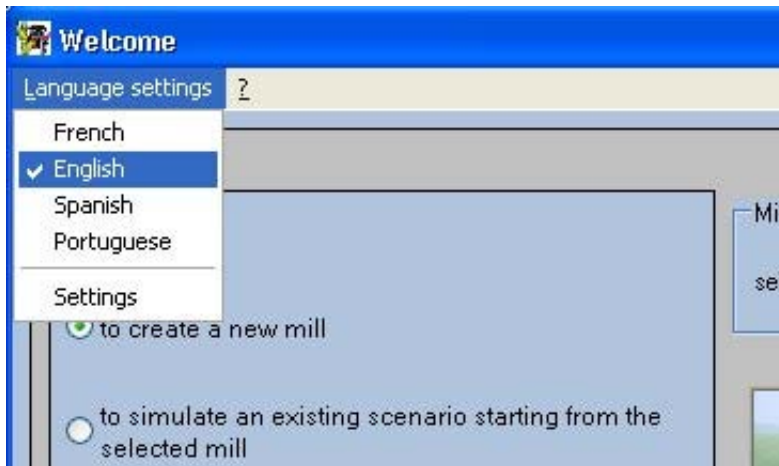


Simply name your file and then open it in Excel.


E. Configuration

1. Choice of languages

The software is currently available in two languages: French and English. To switch language, select the "Configurations" menu in the "Welcome" window of the application and click on the desired language. Depending on future applications, the software could eventually be translated into Spanish.

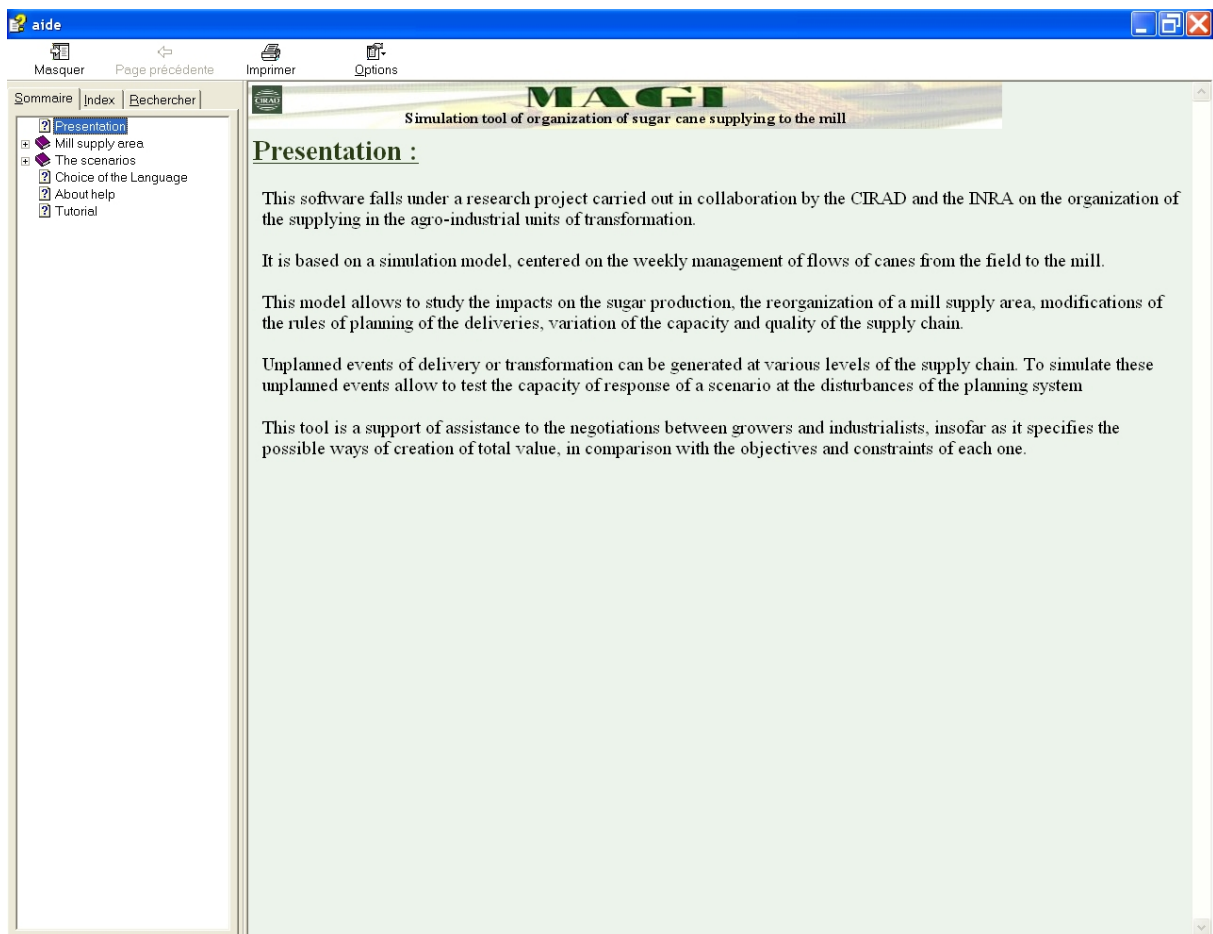


2. Help

In each window of the application, users can get help by typing "F1" on the keyboard, or by clicking the button or the menu with the following icon: 

Help is also available directly in the application directory: **C:\Program Files\CIRAD\Magi2004\AideMagi.chm**. A shortcut is available in: **Start - all programs - MAGI2**.

The online Help window is as follows:



The **Contents** are listed on the left under headings and subheadings.

From the **Index, users can** view specific Help pages from keywords.

The "**Search**" function displays a list of pages containing the entered keywords.

A **Preview** of the selected page is displayed in the right pane.